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# Color Micro Journal™

The Color Computer Monthly Magazine

\$1.95 per issue Vol. 1, Issue 2 October 1983

## THIS 'N THAT

The **BIG NEWS** this month is that **OS-9** has finally arrived for the Color Computer. The **ASTOUNDING** part of the Radio Shack **OS-9** Package, besides the price, is the **DOCUMENTATION**. You 'Old Time Radio Shack Followers' will not believe what you see. Jon Shirley has been telling us that the main reason for the "lack" of documentation with a lot of their products was the restrictions placed on releasing that information by **Microsoft**; I am becoming a believer. I have maintained all along that if you have a viable product, the **DOCUMENTATION** will be the "make or break" factor; especially with a 'strange' product. **UNIX** Users would have little trouble using **OS-9**, but I'll wager that not many of the Color Computer Users have much of that kind of a background. Since we feel that the **OS-9 Operating System** could easily become the **PRIMARY** Operating System for **6809-Based** Computer Systems (and possibly **68000-Based**, also), we have devoted quite a bit of space in this issue to **OS-9**, and will continue to do so in the future (take note, **OS-9 Users**, we are looking for Articles, Programs, Hows and Whys, etc.).

We have been running a "Preliminary Release" of the **CoCo OS-9** for a little while now, and just received an "Official" Package from Radio Shack. The System works just like it does on the "BIG" Systems (**GIMIX**, **Helix**, etc. — we have a **GIMIX III** System set up with the **Level III OS-9**; a special **Level II** which takes advantage of the "Smart" I/O Boards, Hardware Protection, etc.), except for the Keyboard 'type ahead' feature. This does not work when the Disk Drives are

Continued on page 27

## OS-9 on the COLOR COMPUTER

One of the "Operating Systems of the Future" is now available for the "little old Color Computer"; **OS-9**. Freely translated, **OS-9** means "Operating System for the **6809**" (**OS-9** is now being written for the **68000**, also). Since it is fairly obvious that **UNIX** and "UNIX-Type" Operating Systems will be running on just about every computer to come out in the next few years, a whole new language is beginning to appear on the horizon. Terms like "Multi-User", "Multi-Tasking", "Pipelines", "Redirected I/O", "Modules" and "Modular Design", "Device Independence", "Position Independent", "Recursion", etc., etc., etc. With a **64K Color Computer and a Disk System** (between \$1000 and \$1200 cash outlay), you can get a **BIG** jump on the future, and have a lot of **FUN** in the process.

### System Requirements and Limitations

To run **OS-9**, you must have a **64K Color Computer** (or "look-alike") and at least one **Disk Drive System**. **OS-9** Disks are **NOT** compatible with Radio Shack Formatted Disks (nor are the Radio Shack **OS-9** Disks compatible with **OTHER OS-9** Systems, such as **GIMIX**, **HELIX**, etc.). The supplied **OS-9** Disk Drivers will support up to **4 Single Sided, 35 Track** Disk Drives, in either **Single or Double Density** Format. There is no provision, to **MY** knowledge, for **Double Sided** Drives (although we "hear" that Radio Shack **IS** coming out with **Double Sided** Drives for the Color Computer). That, Lads and Lasses, is just about the sum and total of the **NO's** and **NOT's** about this System; overall, the complete package is **FANTASTIC!**

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### Color Computer OS-9; the Package

We had been running a preliminary release of **OS-9** on the Color Computer for a few weeks, and received the "Official Radio Shack" version for Review a couple of days ago. To put it mildly, this package is **IMPRESSIVE!** For \$69.95 (Radio Shack Catalog Number **26-3030**), you receive a **9 1/2" x 7 5/8" x 2"** package containing **4 Manuals** and **2 Disks**.

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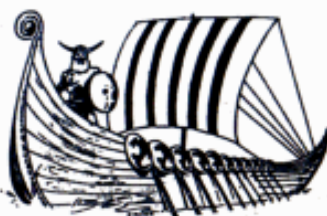


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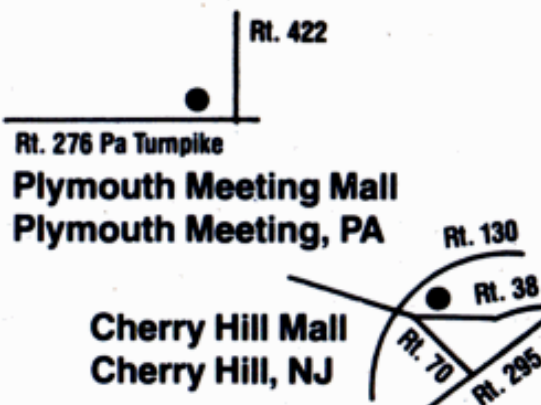
## COLOR COMPUTERS NEWS 1981 BACK ISSUES

This is the complete collection of articles appearing in the first 4 issues of Color Computer News (May to December of '81). 17 different topics are covered plus continuing features like "ReMarks", Kids Page and New Products.

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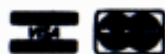
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The Manual set includes  
**Getting Started With OS-9 Manual**,  
34 pages; folded.  
**OS-9 Commands Manual**,  
140 pages; spiral wire bound.  
**OS-9 Program Development Manual**,  
174 pages; spiral wire bound.  
**OS-9 Technical Information Manual**,  
178 pages; spiral wire bound.

There is a Disk in the Commands Manual and one in the Technical Information Manual. These Disks consist of a Radio Shack formatted **OS-9 BOOT** Disk which contains a short BASIC Program named "\*", and a Binary Program which has two parts; a Disk RPM Test Routine and the OS-9 Boot Routine for **Disk BASIC V1.0 ROM**. The other Disk is the **OS-9 System Master Disk**, which can be booted with the "DOS" Command in the **Disk BASIC V1.1 ROM**. It consists of **OS-9 Level I, Version 1.2** and also includes the **Text Editor**, the **Special OS-9 Assembler** (designed for the modular, multi-tasking environment of OS-9 and optimized for use by the high-level languages such as Pascal and C), and the **Interactive Debugger**.

#### Color Computer OS-9; DOCUMENTATION

**PASS THE CROW**, PLEASE (may I have some Mustard with it?). If you read my remarks about the CoCo OS-9 in the **Color Micro Journal** Editorial last month, you know that I said that if Microware and Radio Shack could write a Manual for OS-9 that would allow people who are NEW to Computers to be able to use OS-9 effectively, they would have performed a miracle. Folks, they **MORE THAN PERFORMED A MIRACLE**; the Manuals are **FANTASTIC**! It is my belief that the **DOCUMENTATION** can "make or break" a major program; if that IS the case, this Radio Shack package is a **SURE WINNER**.

All Manuals are 9" x 7" in size, and, except for the "Getting Started" Manual, are about 1/2" thick. You probably were not too "thrilled" with the original set of BASIC Manuals that came with the Color Computer; little **INFORMATION**, little **ORGANIZATION**, little or no **INDEX**, etc. Well, I'm happy to report, there is **NO** similarity between the new **OS-9 Manuals** and the original BASIC Manuals; **ABSOLUTELY NONE**! These new Manuals are well structured, concise but complete, and **WELL ORGANIZED**, **REFERENCED**, and fairly well **INDEXED**; with numerous internal references to other sections of the Manuals for "more information".

#### Manual; "Getting Started With OS-9"

The "Getting Started With OS-9" Manual is the starting point, and is strictly Radio Shack Color Computer OS-9 oriented. It starts with a Chapter on "What Is OS-9?" which begins with "What Is an Operating System?" (Hallelujah!), and then takes a quick look at OS-9, the Multi-Level Filing System, Multiuser/Multitasking Operation, and the Device-Independent Input/Output System. The next Chapter runs through the Disk Drive RPM Test procedure.

Chapter 3 covers "Starting Up OS-9". Basically, if you have a **V1.0 Disk ROM**, you install the **OS-9 BOOT** Disk and **RUN\*\***; select "b" when the "Boot or Test" Option is requested, insert the **OS-9 System Master** Disk when asked, and hit "any key" to get OS-9 on line. If you

have a **V1.1 Disk ROM**, simply insert the **OS-9 System Master** Disk and enter the Command 'DOS'. In either case, you will get a Screen Full of OS-9 Copyright notices, and a

**YY/MM/DD HH:MM:SS**

prompt. Answer this, either exactly as it is requested, or by inserting spaces in place of the "/" and ":" shown (for example, entering

**83 9 10 13 27 30<cr>**

will set the date and time to 1:27:30 PM on Sept. the 9th, 1983 -- OS-9 works with a 24 hour clock). You can quit with the date, and the clock will start at 00:00:00. After it is happy with that entry, you will receive the **OS-9:** prompt. The whole thing takes 15 to 20 seconds.

"Getting Started" then walks you through **FORMATTING DISKS AND MAKING BACKUPS**. It is oriented towards a Single Disk System, but includes an explanation of the procedure for "Two-Drive Users" also. The supplied OS-9 System CAN be used on a Single Drive System; all Commands such as **FORMAT**, **COPY**, **BACKUP**, etc., will prompt for Disk Exchanges if you try to accomplish them to /D0. If you are using a Single Disk System, I would suggest you delete the "DEFS" Directory (see the **DELDIR** Command), **AFTER** you have made your **BACKUP** Systems Disk, to free up some space on that Disk; it is pretty **FULL** as it comes from Radio Shack.

After the Manual gets you up-and-running on your backup disk, they move on into "EXPLORING THE OS-9 FILE SYSTEM" by discussing this powerful feature, and then creating and deleting some files and directories. Then there is a discussion of the Error Reporting System and **PRINTERR** Command, and a final chapter which presents a "quick look" at some of the Common Commands and Command Modifiers (Alternate Memory Size, I/O Redirection, Concurrent Execution, and Pipes).

All in all, an outstanding job of leading a new user through getting the OS-9 System "up-and-running" smoothly, while keeping him informed of the "Whys and Wherefores" in the process. Even for the experienced OS-9 User, this book is a **MUST**; it won't take long to go through it, and it does not get boring. Talk about Top-Down Problem Solving; this book accomplishes it in **SPADES**! It also provides the required background for understanding the next book in the series to be "consumed" by the User; **OS-9 Commands**.

#### Manual; "OS-9 Commands"

The "OS-9 Commands" Manual is effectively organized into three parts; five Chapters on the OS-9 System and its operation, a Chapter covering the complete Command Descriptions, and four Appendixes covering the Error Codes, Display System Functions, Keyboard Codes, and Keyboard Control Functions.

Chap. 1 presents an introduction to the "Shell", which is the Program which interprets the Users Commands for the OS-9 System. While OS-9 is extremely powerful, it is also extremely complex, internally; Shells' job is to make this complexity invisible to the User. Any time you see the "OS-9:" prompt, the Shell is active and awaiting your command. Topics covered in this Chapter include the Command Structure, some

Common Command Formats, Using the Video Display and Keyboard, and Sending Output to the Printer. Chap. 2 introduces the OS-9 File System, discussing the Unified I/O System, the Organization of the File System, Directories, the File Security System, and Reading and Writing from Files.

With the background of the first two chapters, Chaps. 3 and 4 then investigate the **Advanced Features of the Shell and Multiprogramming and Memory Management**. Chap. 3 covers "More About Command Line Processing", "Execution Modifiers", "Command Separators", "Command Grouping", "Built-in Shell Commands and Options", "Shell Procedure Files", "Error Reporting", "Running

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If articles are submitted on paper, they should be either Typed or Printed **Single Spaced** with a **MAXIMUM Line Length of 4"** on normal 8 1/2" x 11" bond or better paper. A good **BLACK Ribbon** must be used because all paper submitted articles will be photo reproduced. NO hand written articles will be accepted (except required art work which goes with an article). Again, **PLEASE use a DARK Ribbon**.

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Compiled Intermediate Code Programs" (such as compiled BASIC0909, Pascal, etc.), and "Editing startup for Timesharing Systems". Chap. 4 discusses "Processor Time Allocation and Timeslicing", "Process States", "Creation of New Processes", and "Basic Memory Management Functions". While it may seem confusing just reading through all of these items at this time, the Manual starts out "easy", and develops each subject as you go (those of you who are familiar with the terminology can begin to see the POWER of this Operating System). It also provides NUMEROUS Examples along the way; as you are reading about these different features, you are entering Commands that DEMONSTRATE each topic. Remember, this is NOT a discussion of what CAN be accomplished with Specialized Programming; ALL OF THESE CAPABILITIES ARE EASILY CONTROLLED FROM THE COMMAND LINE!

Before we continue with the "OS-9 Commands" Manual, lets look at a few simple examples to get a "feel" for using the OS-9 System. Commands from the Keyboard begin with a Program Name, followed by the Filename to be operated on, and any "parameters", or variables. For example;

OS-9:list letter<cr>

would cause the Command named "list" (or List, or LIST; OS-9 ignores Upper Case and Lower Case differences for names from the Command Line) to work on the File named "letter"; in this case, list the file named "letter" to the Display. Also, ALL Command Line entries are terminated with a Carriage Return (the ENTER Key), so we will drop that from the examples. Finally, the "OS-9:" shown preceding the

Command is the normal OS-9 prompt from the Shell. But, suppose we wanted to Print the file named "letter" on the Printer. We can "re-direct" the Output from the Display, where it normally goes, to the Printer with a Command Line "parameter", the ">" symbol, like so;

OS-9:list letter >/p

Now, the output will be sent to the Printer; the Printers "Name" is "/p". In OS-9, ALL Device Names begin with a slash; /d0 is Disk Drive 0, /d1 is Disk Drive 1, /term is the Color Computer Keyboard and Display, /t1 is the Second Users Terminal hooked to the Color Computer's Serial connector (yep; Multi-User), etc. You can use an entry like

OS-9:list letter | tee /p /d0/letter\_file

and get a listing of the file named "letter" to BOTH the Printer (the "/p") AND to another File on Drive 0 named "letter\_file" at the SAME TIME. This also shows some of the Shells work, in that the exclamation point ( ! ) causes the Output to be "piped" to the "tee" Command, which handles sending output to two different places at the same time. The term "pipe" means to take the output of a program, in this case "list", and use that as the INPUT for the next program, in this case "tee". (Have you tried to get a Radio Shack DIR Listing on the Printer? There ain't no way without a special program written specifically to list the Directory out to the Printer!) As a matter of FACT, OS-9's "Unified I/O System" allows you to send just about ANYTHING to ANYPLACE at ANYTIME from ANYWHERE! Hows that for flexibility?

Back to the "OS-9 Commands" Manual. The

Manual has led you through an introduction to the Shell and the OS-9 File System, and then gone into greater detail in discussing the Shells' REAL capabilities and the operation of OS-9 in running Multiple Programs and its Memory Utilization. Chapter 5 discusses the "Use of the System Disk" through examining the "OS-9 Boot File", "The SYS Directory", "The startup File", "The CMDS Directory", "The DEFS Directory", "Changing System Disks", and the important subject of "Making New System Disks". By this time, you are to the point where you can effectively USE the OS-9 Operating System, because you UNDERSTAND what is happening, and HOW to accomplish various tasks as you need them.

Chap. 6, the final chapter in the Manual, presents the "System Command Descriptions". This is a DETAILED discussion of EACH Command, in alphabetical order, with examples of syntax and results. You may want to put a tab at the beginning of this section, because you will be referring to it often as you use the OS-9 System. A summary of the provided Commands follows:

- attr - Change file attributes
- backup - Make a backup of a disk
- binex - Convert binary to s-record
- build - Build a text file
- chd - Change working directory
- chx - Change execution directory
- cmp - File comparison utility
- cobbler - Make a bootstrap file
- copy - Copy data
- date - Display system date and time
- dcheck - Check disk file structure
- del - Delete a file
- deldir - Delete all files in a directory
- dir - Display file names in a directory

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The WORD-PAK is a video board designed to plug into the expansion port of the Color Computer. The board produces an 80 column video display that compares easily with the high priced terminals. Software, included with the board, provides such terminal functions as; erase to end of line, erase to end of screen, home cursor, x-y cursor positioning, etc. and the ability to re-program the display for different screen formats. This last feature is useful in that it allows software, written for other computers (such as the Model I), to be run on the Color Computer. Additional software support includes a Flex patch, which allows the user to run ALL standard Flex software, and an enhanced version of TEXPRO III (text editor/processor).

### MEM-PAK \$110.00

16K RAM/ROM expansion board. Expand RAM beyond 64K (using the C-C BUS) or put your programs/utilities in ROM for instant loading. The board utilizes 24 pin, compatible memory devices. (Supplied with 16K RAM).

### P-C PAK \$ 79.00

Free up your serial port for communication by adding this fully buffered, Centronics compatible, parallel printer port to your computer. The cartridge can be supplied with an optional real time clock for \$122.95.

### C-C BUS \$149.95

The C-C BUS is an expansion bus which connects to the expansion port of the Color Computer and provides the user with six, software selectable, expansion ports. The bus is completely compatible with any size system and automatically senses system size to prevent contention problems. A unique feature of the C-C BUS is the ability to expand system memory size beyond 64K by adding one (or more) MEM-PAKs to the bus. A typical system might contain a disk controller, a parallel printer cartridge, a 16K RAM board, and a WORD-PAK, all installed and available to the computer.

### PROTO-CoCo \$ 10.95 (3/\$20)

Build your own expansion projects on this prototyping board that will mount inside a disk controller case when you're finished. Included is a manual with several expansion ideas.

### BARE BOARDS

Save money by building your own. We will supply complete documentation including schematics, layout and parts list.

|             |         |
|-------------|---------|
| WORD-PAK BB | \$17.95 |
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### SPECIAL:

To celebrate Color Micro Journal's premier issue, we are offering the C-C BUS and the WORD-PAK at special prices. If you order before September 30, 1983 and you mention that you saw the add in Color Micro Journal, you can purchase the C-C BUS for only \$129.95. Or you can purchase the WORD-PAK for only \$99.95 if you order it with the C-C BUS at the regular price.

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**display** - Display converted characters  
**dsave** - Generate procedure file to copy files  
**dump** - Formatted file dump  
**echo** - Echo text to output path  
**exbin** - Convert s-record to binary  
**format** - Initialize disk media  
**free** - Display free space on a device  
**ident** - Print OS-9 module identification  
**kill** - Abort a process  
**link** - Link module into memory  
**list** - List contents of disk file  
**load** - Load module(s) into memory  
**login** - Timesharing system log-in  
**mkdir** - Create directory file  
**mdir** - Display memory directory  
**merge** - Copy and combine files  
**mfrees** - Display free system RAM memory  
**OS9Gen** - Build and link a bootstrap file  
**printerr** - Print full-text error msgs  
**procs** - Display processes  
**pwd** - Print working directory  
**pxd** - Print execution directory  
**rename** - Change file name  
**save** - Save memory module on a file  
**setime** - Activate and set system clock  
**setpr** - Set process priority  
**sleep** - Suspend process for period of time  
**shell** - OS-9 command interpreter  
**tee** - Copy standard input to multiple output paths  
**tmode** - Change terminal operating mode  
**tmon** - Timesharing monitor  
**unlink** - Unlink memory module  
**verify** - Verify or update module header and CRC  
**xmode** - Examine or change device initialization mode

The rest of the "OS-9 Commands" Manual consists of a listing and description of the Error Codes in Appendix A. A discussion of the "Display System Functions" covering the **Alpha Mode**, with the 10 Control Codes supplied for simulating a typical computer Terminal; the **Graphics Mode** Display, which presents the Graphics Control Commands (such as Set Color, Draw Line, Draw Circle, Cursor Positioning, etc.); and accessing the **Joysticks** is included in Appendix B. Appendix C provides the Keyboard Codes (full ASCII coverage); and Appendix D covers the Keyboard Control Functions. Some of the information in the Appendixes is oriented towards Assembly Language access and utilization of the functions with the normal OS-9 "System Calls" (which are fully explained in the **OS-9 Technical Information Manual**), but can also be used through **BASIC99**, **Pascal**, **C**, etc.

The "Getting Started" and "Commands" Manuals contain all of the information that you need to be able to USE OS-9. Every OS-9 System Owner will need to know these two Manuals inside out. The other two Manuals will become more valuable as you become more familiar with the Operating System.

#### Manual; OS-9 Program Development

The "OS-9 Program Development" Manual covers the three "working" Programs that are supplied with the package; the **Macro Text Editor**, the **Assembler**, and the **Interactive Debugger**. Both this Manual and the "Technical Information" expect you to be familiar with the 6809 Instruction Set. We will look at these three programs in detail after looking at OS-9 next month.

#### Manual; OS-9 Technical Information

The final Manual in the set is the **OS-9 Technical Information Manual**, which (to quote from the Introduction in the Manual) "provides all the information necessary to install, maintain, expand, or write assembly-language programs for OS-9 systems. It assumes you are familiar with the 6809 architecture, instruction set, and assembly language." The first chapter discusses the "System Organization", introducing the Kernel, Clock, and INIT Modules, the Input/Output Modules, the Shell, and the Boot Module. Chap. 2 then delves into the Kernel, Chap. 3 discusses Memory Modules, Chap. 4 the Unified I/O System, Chap. 5 the Random Block File Manager, and Chap. 6 the Sequential Character File Manager. Each of these major Sub-Systems are presented in DETAIL, including their function, operation, and Assembly Language interfacing.

Chap. 7 discusses Assembly Language Programming Techniques as they apply to the OS-9 System, including how to write Position-Independent Code, Addressing Variables and Data Structures (which are almost NEVER at a fixed Memory Address location), the Stack Requirements, Interrupt Masks, Using Standard I/O Paths, Writing Interrupt-Driven Device Drivers, and provides a Sample Program (the LIST Command). These are generalized discussions which present "guidelines", not details. Chap. 8 provides about 75 pages of detailed "System Call" descriptions.

The Appendixes provide an Alphabetical System Call List, Numerical System Call List, detailed Memory Module Diagrams, the Standard Floppy Disk Format, System Call Error Codes, and Module and I/O Attributes.

#### Manuals; Summary

There is at least one full nights reading in these four Manuals; if you just SKIM them. As I stated at the beginning; an **EXCELLENT Set of Manuals** that are professionally packaged and professionally organized. If you need some kind of information, it is probably there SOMEWHERE; all you have to do is study them. Again, I caution you, DON'T expect to see a lot of fixed Addresses in these Manuals; not because they are not providing that information, but because OS-9 has VERY FEW Fixed Addresses within the System. Everything is relative to everything else. The Display Screen is still at \$0400, and the Interrupt Vectors are still in the \$0100 area, but, as you will discover when you study the Manuals, a Users Program may load ANYWHERE in the Memory Area. Such is OS-9, and that is where it derives it's POWER and FLEXIBILITY.

Let me close this discussion of the Radio Shack OS-9 System Documentation with a couple of suggestions for "Reference Manuals" that you will find INVALUABLE in working with OS-9. The first is the "Old Standby" Programmers Reference

#### 6809 Assembly Language Programming

by  
 Lance A. Leventhal  
 published by  
**OSBORNE/McGraw-Hill**  
 630 Bancroft Way  
 Berkeley, CA 94710

The second book that I cannot recommend too highly, ESPECIALLY for anyone who plans on writing Assembly Language Programs for the OS-9 Operating System, is

**Microcomputer Architecture & Programming**  
 by  
 John F. Wakerly  
 published by  
**John Wiley & Sons**

This book provides the "How To", where Leventhal provides "What to do it With". It is easy to read for a technical book, is heavily 6809 oriented, and covers everything from an introduction to Pascal (which is used to show the "structural concepts" of the subject being discussed), the Number Systems, Basic Computer Organization, Assembly Language Programming including the Assembler and Relocating Assemblers and Loaders, through Subroutines and Parameters, Input/Output, Interrupts, DMA, and Processes, and Program Development. It has excellent discussions of Recursion, Coroutines, Stacks, Queues, Static and Dynamic Parameter Allocation, etc.; normally with 'pseudo 6809' Code examples. It also provides an excellent comparison and analysis of the PDP-11, 68000, Z8000, 9900, 6809, 8086, and MCS-48 Microcomputer Architectures. (Wakerly is available from **Southeast Media Supply** for \$24.95 plus shipping - call 800-338-6800).

— RLN —

## Simplified MENU Programming

Books and magazines encourage menu style programming because it makes a program easier to learn to use. Writing the extra code needed to print out a menu, and then the chain of IF/GOTO statements demonstrated in these books is a tedious process that turns many programmers away from menu programming.

Part of this tedium can be relieved by using the **INSTR** Function of **Extended Color BASIC** to determine the argument for an ON/GOTO or ON/GOSUB statement.

Here is a program segment that demonstrates this trick:

```
100 CLS
110 PRINT "OPTIONS..."
120 PRINT " [L]OAD A FILE,"
130 PRINT " [O]RDER THE FILE,"
140 PRINT " [P]RINT A FILE,"
150 PRINT " [S]AVE A FILE,"
160 PRINT " [E]XIT THE PROGRAM,"
170 PRINT " YOUR SELECTION":A$
180 A$=LEFT$(A$,1)
190 ON INSTR("LOPSE",A$) GOSUB 1000,
    2000, 3000, 4000, 5000
200 GOTO 100
```

If A\$ is not "A", "O", "P", "S" or "E" control will pass to line 200. See your **Extended Color BASIC Manual** for a complete description of the INSTR Function.

Troy Brumley

Color Micro Journal



# Elite-Calc

## COLOR COMPUTER WORKSHEET

**Elite Software**  
Box 11224  
Pittsburg, PA 15238

Reqs. 16K Ext. BASIC  
Tape or Disk \$44.95

**ELITE\*CALC** is an extremely powerful worksheet, and for around \$45, it must be the all-time best software buy for the Color Computer. For the beginner who started with Radio Shack's "SPECTACULATOR" version of the spreadsheet, **ELITE\*CALC** is a spectacular improvement. It is not limited to formulas that must apply to entire rows or columns, and its machine language is much faster. For the more advanced computerist who is familiar with Supercalc type spreadsheets, you should feel right at home with the performance of this software.

The worksheet has 255 numbered rows and 255 columns that are labeled A thru IV. Many other products only have 100 columns, 30 rows deep. This is bigger than a 64K Color Computer can use completely, yet it will run on a 16K or 32K machine. My 64K machine had 20677 bytes available for headings, formulas and data.

The commands are all one key entries, using the first letter of the command word. This makes for minimum typing overhead and is easy to remember. And if you do forget, the entire list is just a (?) away. The range of commands should satisfy even the most demanding user. They are almost luxurious to the occasional home computerist and more than adequate for the business user of the Color Computer.

You can COPY words to other cells individually or in entire blocks, REPLICATE numbers or formulas to entire columns or rows, BLANK out large blocks or specific cells, DELETE or INSERT rows or columns, HIDE rows or columns from screen or printer, or MOVE cells, rows, columns, or whole blocks to another location. The really good news is that you can Sort rows or columns, in ascending or descending order; and the whole line moves with the sorted cell. Lists can be alphabetized by names, or reordered by ages, or prices, or other number lists.

The entire Radio Shack EDIT routines are available for formula or text changes, and the complete set of EXTENDED BASIC functions can be used in cell formulas. Another handy feature is LOOKUP; it can be used to look up a value in a file of up to 255 items, and select a corresponding value to be used in a cell formula. Only your own imagination would limit your use of this feature. Several other similar features are AVERAGE, COUNT, MAX, and MIN, that can look at a range of cells and calculate the unique value that you asked for.

Moving around the worksheet is accomplished by the four standard ARROW keys, and they repeat as long as you hold the key down. The AUTOMATIC mode will advance the cursor in the same direction

as the last move after each computer entry. JUMP will move the cursor immediately to any cell you specify.

The FORMAT command (F) instructs the computer to place COMMAS in large numbers, place DECIMALS where needed, use DOLLAR signs, ROUND-OFF to integers, LEFT or RIGHT justify numbers and text separately, insert MINUS signs, and several other variations such as COLUMN or ROW WIDTH, SCIENTIFIC notation, etc., to customize the spreadsheet to your own desires. These formats can be applied to a single cell, to a whole or part of a row or column, or to a complete block of cells; just about any range you specify.

**GRAPHIC BAR CHART:** this built-in feature can display or print a bar chart to graphically illustrate a group of values that have been calculated or input. An asterisk (\*), or any user-defined symbol can be used to form the chart bars.

The Spectaculator user will certainly appreciate the HIDE command. This feature allows you to look at two parts of the rows, or two parts of the columns, at the same time. The gap between visible portions can be one or many rows (or columns). Its main advantage is to always be able to see the column headings while the lower areas of the worksheet are being used. This is not as good as Multiplan's four windows, but then Multiplan is not available for the Color Computer, and has a few more 0's on the price tag.

**PRINTING** your worksheet is as simple as specifying the corners of the block to be printed. A predetermined TITLE will be placed on each page. The printing format is user controlled including

CONDENSED or EMPHASIZED characters, PAGE LENGTH, LINE WIDTH up to 132 characters, and BAUD rate.

Up to now this article has mentioned the good points of **ELITE\*CALC**. So, to be fair to you as a potential user, the few not-so-good points will be presented next. However, they are very few and may not even be considered a problem to most of the average users of the system. The formulas that have been set up for the individual cells can be reviewed (and changed) by using the EDIT routine; it would be nice if the formulas appeared as each cell was stepped through. This compromise does provide for quick and complete editing, however.


The "Formats" that have been setup can NOT be reviewed at all; you CAN observe their effects in individual cells and it is easy to change the format. The procedure recommended by the supplier is to set up the formats as they are needed; you shouldn't need to review them later. Another procedure is to write down the formats for each cell range as they are set up; this form of self-documentation is a good habit to acquire, anyway.

A minor peeve of mine is probably a matter of opinion concerning the screen size. As you know, the Color Computer normally works with a 32 character video screen. **ELITE\*CALC** uses this format; they do it as a matter of design choice. The 51x24 screen and other larger sizes were considered, but decided against, in favor of the easier-to-read larger characters on the 32x16 screen. This choice does not seriously affect the usefulness of the worksheet.

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(615) 875-8656 • P.O. Box 15892 • Chattanooga, Tn 37415





The **ELITE-CALC** spreadsheet can be used in your home for many interesting and useful projects. Your family checkbook balancing is a good example. Most people have a checking account, and many families have difficulty balancing it every month, so we'll show how your checkbook could be handled on an electronic spreadsheet. This example is intended to suggest just one of the many ways you can put it to work at home as well as at the office.

After familiarizing yourself with the ELITE\*CALC system, begin setting up the HEADINGS for the checkbook. For example:

Use the following procedures:

1. In the first row, type whatever title you would like to give the worksheet, such as:

2. In the next rows, type in the headings, as shown, or modify them to fit your own special needs. Use the appropriate commands to accomplish the format shown.

3. Set up the formulas as shown:

Cell H9: Formula = H8-E9+G9 (This calculates the Bank Balance after the 1st check).

Cells H10 thru H99:

REPLICATE Range H9 <Enter>

REPLICATE To H10:H99 <Enter> <Enter>;  
(This copies the formula in cell H9 to  
the cells below it, so the Bank Balance  
will be computed for each checkbook  
entry).

Cell I9: Formula = (G9-E9)\*F9

Cells 110 thru 199:

REPLICATE Range I9 <Enter>

REPLICATE To I10:I99 <Enter> <Enter>  
(This copies the formula in cell I9  
the cells below it).

Cell J9: Formula = H8+I9

Cell J10: Formula = J9+I10

Cells J11 thru J99:

REPLICATE Range J10 <Enter>

REPLICATE To J11:J99 <Enter> <Enter>

(This creates the formulas for comparing your checkbook balance with the Bank Statement).

Now that you have the framework set up, try putting some information in it.

| 1 FAMILY CHECK-BOOK BALANCING EXAMPLE     |         |                   |        |        |      |                 | FILE: CHECK BK.730 |           |
|---|---------|-------------------|--------|--------|------|-----------------|--------------------|-----------|
| 2 USING ELITE+CALC ELECTRONIC SPREADSHEET |         |                   |        |        |      |                 |                    |           |
| 3   |         |                   |        |        |      |                 |                    |           |
| 4   | B       | C                 | D      | E      | F    | G               | H                  | J         |
| 5   | ENTRY   | ITEM DESCRIPTION  | CHECK  | CHECK  | CHK. | DEPOSIT         | BANK               | BANK      |
| 6   | DATE    |                   | NUMBER | AMOUNT | OFF  | AMOUNT          | BALANCE            | STATEMENT |
| 7   |         |                   |        |        |      |                 |                    |           |
| 8   | 7/26/83 |                   |        |        |      | BALANCE FORWARD | \$                 | 963.25    |
| 9   | 7/27/83 | RADIO SHACK       | 327    | 79.83  |      |                 |                    | 883.42    |
| 10  | 7/27/83 | SEARS ROEBUCK     | 328    | 127.19 |      |                 |                    | 756.23    |
| 11  | 7/28/83 | HOME MORTGAGE CO. | 329    | 385.58 |      |                 |                    | 370.73    |
| 12  | 7/28/83 | POWER UTILITY CO. | 330    | 86.25  |      |                 |                    | 284.48    |
| 13  | 7/29/83 | GOODWRENCH GARAGE | 331    | 227.81 |      |                 |                    | 56.67     |
| 14  | 7/30/83 | WEEKLY PAYCHECK   |        |        |      |                 | 275.16             | 331.83    |
| 15  |         |                   |        |        |      |                 |                    |           |

Type in your beginning bank balance in cell H8. Then type in your checks and deposits, one row at a time. As you input each amount, the Bank Balance will be printed for you. Use your existing checking account information so you can compare the totals as you go. Do not put anything in the "Chk.Off" column at this time.

Now let's assume that you have just received your July bank statement and it says you have \$411.58 as your balance and that all your checks have cleared the bank, except the \$86.25 one to Power Utility Co., and also that they charged you \$6.50 for July bank charges.

| 1 FAMILY CHECK-BOOK BALANCING EXAMPLE     |         |                   |        |                 |         | FILE: CHECK BK.731 |           |
|---|---------|-------------------|--------|-----------------|---------|--------------------|-----------|
| 2 USING ELITE+CALC ELECTRONIC SPREADSHEET |         |                   |        |                 |         |                    |           |
| 3   | B       | C                 | D      | E               | F       | G                  | H         |
| 4   | ENTRY   | ITEM DESCRIPTION  | CHECK  | CHECK CHK.      | DEPOSIT | BANK               | BANK      |
| 5   | DATE    |                   | NUMBER | AMOUNT          | OFF     | AMOUNT             | STATEMENT |
| 6   |         |                   |        |                 |         |                    |           |
| 7   |         |                   |        |                 |         |                    |           |
| 8   | 7/26/83 |                   |        | BALANCE FORWARD | 0       | 963.25             |           |
| 9   | 7/27/83 | RADIO SHACK       | 327    | 79.83           | 1       | 883.42             | 883.42    |
| 10  | 7/27/83 | SEARS ROEBUCK     | 328    | 127.19          | 1       | 756.23             | 756.23    |
| 11  | 7/28/83 | HOME MORTGAGE CO. | 329    | 385.50          | 1       | 370.73             | 370.73    |
| 12  | 7/28/83 | POWER UTILITY CO. | 330    | 86.25           |         | 284.48             | 370.73    |
| 13  | 7/29/83 | GOODWRENCH GARAGE | 331    | 227.81          | 1       | 56.67              | 142.92    |
| 14  | 7/30/83 | NEEDLY PAYCHECK   |        |                 | 1       | 275.16             | 331.83    |
| 15  | 7/31/83 | BANK CHARGE       |        | 6.50            | 1       | 325.33             | 411.98    |

| I<br>HIDDEN | H<br>BANK | BANK    |
|-------------|-----------|---------|
| COLUMN      | BALANCE   | PROFILE |
| -79.83      | 963.25    | .....   |
| -127.19     | 883.42    | .....   |
| -385.98     | 756.23    | .....   |
| -86.25      | 378.73    | .....   |
| -227.81     | 284.48    | .....   |
| 275.14      | 56.67     | .....   |
| -4.98       | 331.83    | .....   |
|             | 325.33    | .....   |

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Buy your Star-Kits software from a dealer, and get an extra savings by sending us your registration form and a copy of your sales slip or invoice. The rebate is \$10 on software priced over \$50, and \$5 for software under \$50. The rebate is in effect until December 24, 1983.

## ILLEGITIMACY PROGRAM

If you have an illegitimate (ahem . . . pirated) copy of a Star-Kits program, we offer you an amnesty as part of our Illegitimacy Program. Send us (a) a working copy of the program, (b) details on where and from whom you got it (with adequate identification of the source), and (c) 25% of the current list price, and we will send you (a) the latest up-to-date copy of the program, (b) a complete and up-to-date manual, and (c) a sales slip welcoming you to the world of happy Star-Kits customers. A small price to pay for a clear conscience?

## MC-10 SPECIAL

To celebrate Star-Kits' being first with MC-10 software, here's our MC-10 Triple-Pak: MC-10 HUMBUG (normally \$29.95), MC-10 REMOTERM (normally \$19.95), and MC-10 COMMTERM (a brand new terminal communications program which sells separately for \$19.95), a total value of \$69.85, all for a special price of just \$55.

## STAR — KITS

P.O. BOX 209 — J  
MT. KISCO, N.Y. 10549  
(914) 241-0287



Just as you probably do on your check stubs, check off all the items that the bank included on its statement. Do this by typing a "1" in the "Chk.Off" column on the row for each item. This tells the computer which items the bank has received. Don't forget to check the "bank charge" also.

Now you should see numbers appear in column "J".. If the last number agrees with the bank's total, your check is balanced. If it does not, it should be a fairly simple job to check your ENTRIES against the bank's figures and find out who made the mistake.

You may have wondered what the "hidden" column is for. It is used to hold an intermediate calculated value that you don't need to see. Therefore, it is "hidden" from the computer's screen and from the printer, but you can "unhide" it at any time you wish. Notice that the hidden column "I" shows in the first Heading example, but is missing from the others. This is done with the "H" command:

```
H(ide) C(olumn) I <enter>
[using only four keystrokes.]
```

The GRAPHICS command (G) allows you to make bar charts using any list of numbers. The BANK BALANCE PROFILE example shown (above) uses the Graphics Display to show the changing pattern of the balance in the bank. This was done by formatting the cells to create graph bars by labeling the cells with a "G", while in the "Format" mode. The following formula was used for PROFILE:= H8 / 40, and then it was replicated to the other cells. The "divided by 40" part of the formula is necessary to reduce the length of the graph bars. Each bar would be one asterisk long for each dollar in the account otherwise. \$963.25 divided by 40 equals 24, so the first bar is 24 asterisks long.

To summarize this review, I'd like to say again that ELITE\*CALC is a great buy as an electronic spreadsheet for the Color Computer and I would recommend it to all "CoConuts".

Reviewed by:  
Jack Lane  
Chief Engineer  
Williams Engineering, Inc.  
Atlanta, Ga.

#### — EDITORS NOTE: —

Due to the noted problem, we sent a copy of this review to Elite Software for their comments. The following reply was received from John Waclo, Pres.

It ALSO includes some EXCELLENT comments on their "Program Design Philosophy", which I think you will find interesting. We have offered ALL of the regular Color Micro Journal Advertisers space to discuss THEIR Products along this same line; why they chose to design their Product the way they did, what were the trade-offs, what type of CoCo User is the Product for, etc. We feel that this will provide YOU, the reader, with a better understanding of the problems involved in designing a product for the "mass market", and more information about the products that the advertiser just can't afford to pay for in the Advertisement.

— RLN —

Color Micro Journal

## ELITE Software comments...

We were pleased to read that, Mr. Lane found ELITE\*CALC well worth recommending. The response from our many users has also been very enthusiastic. ELITE\*CALC is finding many, and varied, user applications throughout the entire world.

Before we respond to Mr. Lane's more specific comments, it might be helpful for the reader to understand our overall program design philosophy. First, we wanted ELITE\*CALC to be powerful, very powerful. With a large variety of powerful commands, ELITE\*CALC would have enough flexibility to successfully take-on many different user applications. Second, we wanted to provide the user with a maximum of worksheet storage space. This would insure that ELITE\*CALC would find business use as well as home use applications. Finally, the program execution speed had to be fast. For successful user acceptance, regardless of application, performance speed was a must. The final version of ELITE\*CALC which we released represents the best balance which we could achieve in meeting our self-imposed program objectives.

Now that you know the total picture, let's take a closer look at some of the parts which Mr. Lane questioned:

Concerning formula display, Mr. Lane would have liked to display formulas continuously as the cursor moved. We felt that would have cluttered the

display. Particularly when you consider that we allow formulas up to 255 characters in length. We chose to have a more graphically clean display by showing the formula via the Edit command; where it could be quickly modified if necessary.

Concerning cell formatting, Mr. Lane preferred some kind of a format-status-review for the user. ELITE\*CALC provides the user with 15 different cell format options that can be used in any combination. We felt, to display this information for a cell, or group of cells, would have required too much precious program memory. Our approach was much more direct. If the user didn't like the present display format for any cell (or group), just re-enter a new format. We made it quick and simple to do.

Concerning screen size, Mr. Lane preferred a 51x24 vs the 32x16 which we selected. We had a lot of discussion concerning screen size. If the higher resolution screen (51x24) were used, more RAM was required for screen display area. If we took that RAM from worksheet space the program would not be as desirable for large worksheet users. If we took the needed RAM from program space, the overall program would not have been as powerful. We could have only put portions of the program in memory at any given time, and used disk calls when they were needed. This would have slowed program speed, and what about tape users? The whole thing was like a balloon. If you squeezed one place, it got bigger

### STAR-KIBBITTS

Welcome to the ninth of my monthly chats. To begin with, a short program and two requests.

When you do a BACKUP on a disk system, the computer is supposed to make an exact copy of a disk. Have you ever wondered whether the copy is really identical to the original? Here is a short program in Basic which allows you to compare two disks (it is written for two drives):

```
10 CLEAR 2000
20 FOR T=0 TO 34 : FOR S=1 TO 18
30 DSK1$ O,T,S,A$,B$
40 DSK2$ I,T,S,C$,D$
50 IF A$=C$ AND B$=D$ THEN 70
60 PRINT "DIFFERENCE ON";T;S
70 NEXT S : NEXT T
```

This program consists of two loops which repeat for tracks 0 through 34, and sectors 1 through 18 of each track. Lines 30 and 40 read the corresponding sectors from drives 0 and 1, and line 60 prints the track and sector number for those sectors which are different on the two disks. You may find it very useful.

OK, now here's the first request. I'd like you to help me with a simple test. Initialize two disks with the DSKINI command, and then BACKUP one of them to the other. Now use the above program to check whether they are really identical, and let me know. I have an ulterior motive — I have run this test on three different computers (including different disk controllers and different drives). On two of them I got identical errors on sector 13 of tracks 5, 11, 17, 23, and 29. I'm curious to see whether anyone else has the same problem.

### TAX DEDUCTION?

Now for the second request. Do you have any Color Computer hardware or software which you would like to donate to a non-profit school? In the last few years, Star-Kits has donated six Color Computers, as well as several printers, disk drives and cassette recorders, to local schools for computer education. If you have any CoCo equipment or software (such as a color computer, or disk system, or Line Printer VII, or anything else which you no longer need), or else if you just feel up to making a tax-deductible contribution of equipment or cash, we'd like to encourage you to do so. Send to the St. Francis School, 12 Green Street, Mt. Kisco NY 10549.

### SALE!

Christmas is slowly approaching, and with it the time for the traditional holiday sales. The following items will be offered at special sale prices until December 24th, 1983:

STAR-DOS 64 is reduced from \$74.90 to \$49.90, the same price as the standard 16/32K STAR-DOS. Actually, for the \$49.90 price you get both versions.

SPELL 'N FIX is reduced from \$69.29 to \$59.29 for the CoCo disk or cassette version, and from \$178.58 to \$125 for the Flex disk version.

HUMBUG-64, the 64K version for Flex or STAR-DOS is reduced from \$59.95 to \$49.95.

Add this to the rebate we announced last month, and you can get Star-Kits software at really bargain prices.

To close, a neat definition (from The Devil's DP Dictionary by Stan Kelly-Bootle) of Gershwin's Law: "It ain't necessarily so!"

### SPELL 'N FIX

Regardless of whose text processor you use, let SPELL 'N FIX find and fix your spelling and typing mistakes. It reads text faster than you can, and spots and corrects errors even experienced proofreaders miss. It is compatible with all Color Computer text processors. \$69.29 in the Radio Shack disk or cassette version; \$178.58 in the Flex version. (20,000 word dictionary is standard; optional 75,000 word Super Dictionary costs \$50 additional.)

### HUMBUG — THE SUPER MONITOR

A complete monitor and debugging system which lets you input programs and data into memory, list memory contents, insert multiple breakpoints, single-step, test, checksum, and compare memory contents, find data in memory, start and stop programs, upload and download, save to tape, connect the Color Computer to a terminal, printer, or remote computer, and more. HUMBUG on disk or cassette costs just \$39.95, special 64K version for FLEX or STAR-DOS 64 costs \$59.95, MC-10 version \$29.95.

### STAR-DOS

A Disk Operating System specially designed for the Color Computer, STAR-DOS is fully compatible with your present Color Computer disk format — it reads disks written by Extended Disk Basic and vice versa. STAR-DOS for 16K or 32K systems costs \$49.90; STAR-DOS 64 for 64K systems costs \$74.90.

### STAR FLEX

The best implementation of FLEX for the Color Computer. Complete with all utilities, text editor, macro assembler, and HUMBUG debug monitor, \$250.00.

### ALL IN ONE — Editor Etc.

Three programs in one — a full function Editor, a Text Processor and a Mailing List/Label program. All this for just \$50. Requires STAR-DOS and 32K, or STAR-DOS 64, or FLEX, specify which.

### DBLS for Data Bases

DBLS stands for Data Base Lookup System. A super-fast system for searching for a selected record in a sequential disk file. Supplied with SPELL 'N FIX's 20,000 word dictionary as a sample data file — lets you look up the spelling of any word in under FOUR seconds. Priced at \$29.95. Requires STAR-DOS.

### CHECK 'N TAX

Home accounting package combines checkbook maintenance and income tax data collection. Written in Basic for either RS Disk or Flex, \$50.

### REMOTERM

REMOTERM — makes your CoCo or MC-10 into a host computer, operated from a remote terminal. \$19.95.

### NEWTALK

NEWTALK — a memory examine utility for machine language programmers which reads out memory contents through the TV set speaker. \$20.

### SHRINK

SHRINK — our version of Eliza, in machine language and extremely fast. \$15.

### EDUCATIONAL SOFTWARE

Introduction to Numerical Methods — college level course on computer math, \$75.00.

We accept cash, check, COD, Visa, or Master Card. NY State residents please add appropriate sales tax. (FLEX is a trademark of Technical Systems Consultants, Inc. Everything else in this ad is a trademark of Star-Kits.)

## STAR — KITS

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somewhere else. We feel that our final decision for a display of 32x16 was the best balance when you give equal consideration to program power, worksheet size, and execution speed.

Finally, it's difficult to comment on Mr. Lane's software "lock-up" situation. While we are presently checking our out-of-memory sense routine, our users have informed us of these "hardware" influenced conditions. ELITE\*CALC must execute from a cold-start condition. Today's market is full of software that does not properly "clear" the machine when you exit. Loading and executing ELITE\*CALC under these conditions will cause undefined results. Also, we have identified two 64K "loader" programs that do not properly initialize Basic. This will also cause problems for ELITE\*CALC. In addition, something is not correct with Mr. Lane's hardware start-up sequence. He indicates that he had 20,677 bytes available for worksheet space on a 64K machine. This is not correct. A properly loaded 64K machine will have over 28,000 bytes available for worksheet storage. Clearly, for some reason, ELITE\*CALC believed it was in a 32K machine. In any case, Mr. Lane followed good operating practice by making frequent saves of his worksheet. It is interesting to note, that had he been in a full 64K mode, ELITE\*CALC would probably have handled his complicated worksheet with sophisticated formulas.

In summary, I think we would all agree that ELITE\*CALC provides extensive user power, sizable worksheet space, and efficient execution speed. I personally want to thank Mr. Lane for his comments. I thought they were very fair. I would also like to thank Mr. Robert L. Nay, Editor of COLOR MICRO JOURNAL, for providing this reviewer/supplier forum. Everybody will benefit from this kind of dialogue.

John Waclo  
ELITE Software  
Box 11224  
Pittsburgh, PA 15238

# RAMSCAN

## A Diagnostic Test for the Color Computer

RAMSCAN is a diagnostic routine written for the Color Computer, and will operate on any size system. RAMSCAN is designed to test each bit in every byte of RAM (memory).

I originally wrote RAMSCAN in December 1982 to help me check the memory in my newly expanded 32K RAM computer. RAMSCAN is easy to understand, because it is one of my early Assembly Language programs and does not contain difficult instruction codes; therefore, it may provide some insight for new Assembly Language programmers.

It has two primary purposes. First; to test from #1024 (\$400 - the Screen beginning address) to the last byte of your machine's RAM. Second; once the last byte of RAM is known from the first test, the information is poked into line 750 from BASIC, which puts the program into a loop that should continue to run indefinitely if desired.

The reason for the second test (loop) is that it tests not only the RAM again and again, but it also exercises the 6809E Microprocessor; therefore, any failure that occurs at a later time should be due to a hardware malfunction (usually

|                      |   |       |        |       |              |
|----------------------|---|-------|--------|-------|--------------|
| 00100                | ***** RAMSCAN *****                                 |       |        |       |              |
| 00110                | * WRITTEN BY EMMETT M. LEWIS, CORPUS CHRISTI, TEXAS |       |        |       |              |
| 36B0                 |   | 00120 | ORG    | 14000 |              |
| 36B0 BE              | 0400  | 00130 | BASE   | LDX   | #1024 SCREEN |
| 36B3 10FF            | 373A  | 00140 |        | STS   | STACK        |
| 36B7 A6              | B4  | 00150 | STRTBT | LDA   | ,X           |
| 36B9 B7              | 3738  | 00160 |        | STA   | TEMPST       |
| 36BC B6              | 00  | 00170 |        | LDA   | #0           |
| 36BE C6              | 00  | 00180 |        | LDB   | #0           |
| 36C0 A7              | B4  | 00190 | TSTLOP | STA   | ,X           |
| 36C2 A6              | B4  | 00200 |        | LDA   | ,X           |
| 36C4 B7              | 3739  | 00210 |        | STA   | TMPBTE       |
| 36C7 F1              | 3739  | 00220 |        | CMPB  | TMPBTE       |
| 36CA 26              | 0D  | 00230 |        | BNE   | FAIL         |
| 36CC B1              | FF  | 00240 |        | CMPA  | #255         |
| 36CE 27              | 1A  | 00250 |        | BEG   | DSPLOC       |
| 36D0 4C              |   | 00260 |        | INCA  |              |
| 36D1 5C              |   | 00270 |        | INCB  |              |
| 36D2 20              | EC  | 00280 |        | BRA   | TSTLOP       |
| 36D4 BE              | 3740  | 00290 | SKPPRG | LDX   | #LASTEN      |
| 36D7 20              | DE  | 00300 |        | BRA   | STRTBT       |
| 36D9 B6              | FF  | 00310 | FAIL   | LDA   | #255         |
| 36DB BE              | 0400  | 00320 |        | LDX   | #1024        |
| 36DE A7              | B4  | 00330 |        | STA   | ,X           |
| 36E0 10FE            | 373A  | 00340 |        | LDS   | STACK        |
| 36E4 39              |   | 00350 |        | RTS   |              |
| 36E5 BE              | 0400  | 00360 | RESTRT | LDX   | #1024        |
| 36E8 20              | CD  | 00370 |        | BRA   | STRTBT       |
| 36EA 10BE            | 3736  | 00380 | DSPLOC | LDY   | SCREEN       |
| 36EE 1F              | 10  | 00390 |        | TFR   | X,D          |
| 36F0 1F              | B9  | 00400 |        | TFR   | A,B          |
| 36F2 BD              | 3723  | 00410 |        | JSR   | SFTNIB       |
| 36F5 1F              | 98  | 00420 |        | TFR   | B,A          |
| 36F7 B4              | 0F  | 00430 |        | ANDA  | #15          |
| 36F9 BD              | 3727  | 00440 |        | JSR   | PUTLSN       |
| GREEN                |   |       |        |       |              |
| 36FC EC              | B4  | 00450 |        | LDD   | ,X           |
| 36FE 1F              | 98  | 00460 |        | TFR   | B,A          |
| 3700 BD              | 3723  | 00470 |        | JSR   | SFTNIB       |
| E ON SCREEN          |   |       |        |       |              |
| 3703 1F              | 98  | 00480 |        | TFR   | B,A          |
| 3705 B4              | 0F  | 00490 |        | ANDA  | #15          |
| 3707 BD              | 3727  | 00500 |        | JSR   | PUTLSN       |
| GREEN                |   |       |        |       |              |
| 370A B6              | 3738  | 00510 |        | LDA   | TEMPST       |
| 370D A7              | B4  | 00520 |        | STA   | ,X           |
| 370F 30              | 01  | 00530 |        | LEAX  | 1,X          |
| 3711 BF              | 373C  | 00540 |        | STX   | TEST         |
| 3714 BC              | 36B0  | 00550 |        | CMPX  | #BASE        |
| 3717 1027            | FFB9  | 00560 |        | LBEQ  | SKPPRG       |
| 371B BC              | 373E  | 00570 |        | CMPX  | END          |
| F EQUAL STAY IN LOOP |   |       |        |       |              |
| 371E 27              | C5  | 00580 |        | BEG   | RESTRT       |
| 3720 16              | FF94  | 00590 |        | LBRA  | STRTBT       |
| 3723 44              |   | 00600 | SFTNIB | LSRA  |              |
| 3724 44              |   | 00610 |        | LSRA  |              |
| 3725 44              |   | 00620 |        | LSRA  |              |
| 3726 44              |   | 00630 |        | LSRA  |              |
| 3727 B1              | 09  | 00640 | PUTLSN | CMPA  | #9           |
| SCREEN               |   |       |        |       |              |
| 3729 22              | 04  | 00650 |        | BHI   | CONVLT       |
| 372B BB              | 70  | 00660 |        | ADDA  | #112         |
| 372D 20              | 02  | 00670 |        | BRA   | MPS1         |
| 372F BB              | 37  | 00680 | CONVLT | ADDA  | #55          |
| 3731 A7              | A4  | 00690 | MPS1   | STA   | ,Y           |
| 3733 31              | 21  | 00700 |        | LEAY  | 1,Y          |
| 3735 39              |   | 00710 |        | RTS   |              |
| 3736                 | 0465  | 00720 | SCREEN | FDB   | 1125         |
| 3738                 |   | 00730 | TEMPST | RMB   | 1            |
| 3739                 |   | 00740 | TMPBTE | RMB   | 1            |
| 373A                 |   | 00750 | STACK  | RMB   | 2            |
| 373C                 |   | 00760 | TEST   | RMB   | 2            |
| 373E                 |   | 00770 | END    | RMB   | 2            |
| 3740 12              |   | 00780 | LASTEN | NOP   |              |
| 0000                 |   | 00790 |        | END   |              |
| 00000 TOTAL ERRORS   |   |       |        |       |              |

from heat buildup). This should allow you to check your Computer if your Software is going blitz at the most inconvenient times.

We put the program into a loop by poking the ending address from BASIC into RAM locations 14142 (M.S.B.), 14143 (L.S.B.). The ending address you poke into END should be about one hundred bytes below the top (end) of RAM because the program does not find the same byte to be end of RAM each time you run Test One.

For example, if you have a 16K machine, Test One should fail about \$3FFF, 16383 (usually less). So, to poke the ending address into END from BASIC (we poke 100 bytes less; \$3F93, or 16283) POKE

14142,63:POKE 14143,155. After the program is executed (EXEC 14000) register X is compared to END in line 570 and, if equal, the program restarts and remains in the loop.

One final word; when the program is executed, it tests the Display Screen Memory first. RAM is then restored, and the byte being tested is output to the screen in HEX. If, for some reason, you wish to double check the failed byte, you may do so by peeking into TEST. From BASIC key in P=PEEK (14140): P1=PEEK (14141): PRINT (P\*256+P1). This will be the byte that failed the test.

By Emmett M. Lewis

Color Micro Journal



# Color Micro Journal™

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## MICROWARE OS-9 2nd Annual Seminar

Microware Corporation, the developers of OS-9 held their second annual OS-9 Seminar in Des Moines, Iowa the 12th, 13th, 14th and 15th August '83. To report the entire affair in detail would probably take up this entire issue. So I will attempt to cover what I thought were the highlights and happenings that you might find interesting.

There were over 400 (estimate) users attending and a total of 23 exhibitors showing their OS-9 hardware and software. The exhibitors were

Motorola  
Positron Ltd.  
Ackerman Digital Inc.  
OS-9 Users Group  
JBM Group Inc.  
Forum 68  
Gimix Inc.  
Tano Corp.  
Micro Intl.  
Microware Systems Corp.  
Specialty Electronics  
Candid Logic  
Smoke Signal Broadcasting  
FHL  
Great Plains Computers  
Matrix Corp.  
Computer Sys Consultants  
Applied Computer Tech.  
Computer Systems Center  
Hazelwood Computers  
Advanced Digital Tech.  
Creative Micro Systems  
Private, Inc.:

My wife Joyce and I arrived early Friday morning having decided to drive (930 miles) the night before as the weather was forecast to be too bad to fly our light plane to Des Moines. Needless to say it was clear as a bell all the way, oh well. Was met at the door of the Marriott Hotel by Richard Don of Gimix who was apparently looking out for all his 'chicks'. This was about 1:30 a.m. Friday morning. After exchanging some (can't remember what) I staggered off to bed after a straight 19 hours of driving. So ended day one.

Friday was sort of a hectic set up day for the exhibitors as the attendance was expected to be greater than originally anticipated. It was. I was personally surprised at the intensity and quality of the hardware and software shown. OS-9 has sorta 'crept' up on the S50 Bus community. Yes, it has been here for over 4 years, but we, or at least I, did not actually comprehend just how solid the growth of OS-9 has been. In my conversations with many others, I gather that they are also somewhat surprised by the depth and penetration made by OS-9 in the past few years. OS-9 has injected new vigor and interest in the 6809 and Standard S50 Bus computers in general, and that can only speak well to the future.

Friday night, the 12th, we gathered for a welcoming banquet at the hotel. The guest speaker was no less than the governor of the state of Iowa, Jerry Branstad. Now, I have been to a lot of computer conventions and such, but this is the first time that I can remember that the governor came, with his wife, and addressed the group. Fact is he

indicated that he and Ken Kaplan have a lot in common, they both are expecting new additions to the family shortly.

I would imagine that by the time this is delivered to you, young Master Aaron Kaplan will have arrived. I sorta stood around all weekend, with a stock of my best cigars, waiting for his arrival. I figured Ken might need some help from an experienced 'cigar handler outer'. But as of this date, nearly a week later, Aaron has refused to cooperate. He is past due and I think I know the reason; he just wants to make sure that Dad and all the others down at Microware have all the major bugs out of OS-9. Well, I can tell you son, from what I saw, have no fear, things sure seemed to be running smooth, and I talked to a lot of very satisfied users from all over the world.

Also during the banquet Ken Kaplan rose and announced that there were some awards to be presented. The following is the 'scrolls' from which the words of praise and predictions were delivered to all. A nice trophy was presented to all honored by this prestigious event. I personally was deeply humbled to realize that my goal and burning desire of enlightenment was finally being acknowledged for what it actually has been these long years. I know that Columbus (the one from across the water and not the one in Ohio, Georgia, etc.) now sleeps more securely. 6 out of 10 ain't bad!

### THE ALEXANDER GRAHAM BELL AWARD

Richard Don,  
Gimix, Inc.

Besides being a prominent computer manufacturer, Mr. Don is an outstanding spokesman to our industry. Outstanding indeed! His unique method of direct communication with a wide audience every night by telephone is truly awesome. Very few Americans appreciate the fact that we would not have the world's finest telephone system if Richard Don were not around to pay for it. Even fewer people are aware of the fact that the upcoming breakup of AT&T is the direct result of one weekend last winter when Richard had laryngitis. We are confident that Mr. Don's tireless efforts will someday help us achieve the goal of replacing every audio telephone set in the country with auto-answer modems. Mr. Don, we salute you!

### THE CRAY-2 AWARD

Ric Hammond,  
Smoke Signal Broadcasting

It would have never occurred to us sleepy backwater folks that OS-9 is the ideal operating system for the CRAY-2 supercomputer. Had it not been for Mr. Hammond's suggestion and encouragement, Microware probably would never have done the CRAY-2 version of OS-9. Even though he didn't really think of it until Smoke Signal's marketing manager, Jim Allday, had already sold three copies, we feel he still deserves this award. By the way, those of you who have Cray 2s at home can get your own copy as soon as Smoke Signal finishes up the joystick drivers. Mr. Hammond, we salute you!

### THE BARTER ECONOMICS AWARD

Mr. Pete Prossen,  
Creative Micro Systems

Pete Prossen is one of our favorite people. His company makes top notch Exorbus systems and boards and he was one of the very first 6809 manufacturers to take a chance on an unproven operating system called OS-9. While his company and products are quite well-known, one little known fact about Pete is that he also owns an avocado grove. We really like avocados, but, unfortunately, they are not indigenous to this area. So we made an interesting deal - we ship software to Pete, and he ships avocados back to us. This is a classic example of an advanced economic concept called "Barter Trade", and we think it's great. The only real problem with it is that we have not been able to get the tax collector to accept vegetables yet. In case some of you who are our customers are thinking of similar schemes, we must warn you that we already have plenty of disks, rams, telephones, computers, automobiles, assorted control systems, software, cotton, corn, rice, and soybeans. However, we are still in need of gold, silver, platinum, diamonds, rare coins, or original 15th century old masters. For being a pioneer in barter economics, Mr. Prossen, we salute you!

### THE INTERNATIONAL GEOGRAPHIC AWARD

Mr. Don Williams,  
'68' Micro Journal

A recent survey indicated that over 6 out of 10 6809 programmers now believe the earth is indeed round. For this amazing feat of mass education we must give full credit to Mr. Don Williams, Publisher of 68 Micro Journal Magazine. Since its inception, the cover of every issue of 68 Micro Journal has had a full color satellite photograph of the planet Earth which clearly exhibits its round shape. We also wish to refute the vicious rumor that the reason Mr. Williams has run the same cover for the last five years is that he got a hell of a deal on two and a half million unused covers for the now-defunct magazine, "Albanian Space Research Digest". But we do not know if there is any truth behind the rumor that over the next five years 68 Micro Journal will switch its cover to a photo of a microprocessor chip in order to teach programmers that integrated circuits are rectangular objects. Mr. Williams, we salute you!

### THE SYSTEM SORCERY AWARD

Mr. Jack DeFrial,  
Advanced Digital Technology

Mr DeFrial is a prophet of a magic box called a real-time emulator system. This ingenious device has contributed greatly to the mental health of 6809 programmers by regularly delivering irrefutable evidence that most bugs are really hardware problems. Upon offering the appropriate incantations to this magic box, it will transform an

Color Micro Journal



# TEN MOST-ASKED QUESTIONS about **DYNACALC**<sup>TM</sup>

## THE ELECTRONIC SPREAD-SHEET FOR 6809 COMPUTERS

---

### 1. What is an electronic spread-sheet, anyway?

Business people use spread-sheets to organize columns and rows of figures. DYNACALC simulates the operation of a spread-sheet without the mess of paper and pencil. Of course, corrections and changes are a snap. Changing any entered value causes the whole spread-sheet to be re-calculated based on the new constants. This means that you can play, 'what if?' to your heart's content.

### 2. Is DYNACALC just for accountants, then?

Not at all. DYNACALC can be used for just about any type of job. Not only numbers, but alphanumeric messages can be handled. Engineers and other technical users will love DYNACALC's sixteen-digit math and built-in scientific functions. You can build worksheets as large as 256 columns or 256 rows. There's even a built-in sort command, so you can use DYNACALC to manage small data bases — up to 256 records.

### 3. What will DYNACALC do for ME?

That's a good question. Basically the answer is that DYNACALC will let your computer do just about anything you can imagine. Ask your friends who have VisiCalc<sup>TM</sup>, or a similar program, just how useful an electronic spread-sheet program can be for all types of household, business, engineering, and scientific applications. Typical uses include financial planning and budgeting, sales records, bills of material, depreciation schedules, student grade records, job costing, income tax preparation, checkbook balancing, parts inventories, and payroll. But there is no limit to what YOU can do with DYNACALC.

### 4. Do I have to learn computer programming?

NO! DYNACALC is designed to be used by non-programmers, but even a Ph.D. in Computer Science can understand it. Even experienced programmers can get jobs done many times faster with DYNACALC, compared to conventional programming. Built-in HELP messages are provided for quick reference to operating instructions.

### 5. Do I have to modify my system to use DYNACALC?

Nope. DYNACALC uses any standard 6809 configuration, so you don't have to spend money on another CPU board or waste time learning another operating system.

### 6. Will DYNACALC read my existing data files?

You bet! DYNACALC has a beautifully simple method of reading and writing data files, so you can communicate both ways with other programs on your system, such as the Text Editor, Text Processor, Sort/Merge, STYLOGRAPH<sup>TM</sup> word processor, RMS<sup>TM</sup> data base system, or other programs written in BASIC, C, PASCAL, FORTRAN, and so on.

### 7. How fast is DYNACALC?

Very. Except for a few seldom-used commands, DYNACALC is memory-resident, so there is little disk I/O to slow things down. The whole data array (worksheet) is in memory, so access to any point is instantaneous. DYNACALC is 100% 6809 machine code for blistering speed.

### 8. Is there a version of DYNACALC for MY system?

Probably. You need a 6809 computer (32k minimum) with FLEX<sup>TM</sup>, UniFLEX<sup>TM</sup>, or OS-9<sup>TM</sup> operating system. You also need a decent crt terminal, one with at least 80 characters per line, and direct cursor addressing. If your terminal isn't smart enough for DYNACALC, you probably need a new one anyway. The UniFLEX and OS-9 versions of DYNACALC allow you to mix different brands of terminal on the same system. There's also a special version of DYNACALC for Color Computers equipped with FLEX (Frank Hogg or Data-Comp versions).

### 9. How much does DYNACALC cost?

The FLEX versions are just \$200 per copy; UniFLEX version \$395; OS-9 version (works with LEVEL ONE or LEVEL TWO) \$250. Orders outside North America add \$7 per copy for postage. We encourage dealers to handle DYNACALC, since it's a product that sells instantly upon demonstration. Call or write on your company letterhead for more information.

### 10. Where do I order DYNACALC?

See your local DYNACALC dealer, or order directly from CSC at the address below. We accept telephone orders from 10 am to 6 pm, Monday through Friday. Call us at 314-576-5020. Your VISA or MasterCard is welcome. Please specify diskette size for FLEX or OS-9 versions. Software serial number is required for the UniFLEX version.

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## Order your **DYNACALC** today!

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#### Foreign Dealers:

Australia & Southeast Asia: order from Paris Radio Electronics, 161 Bunnerong Road (PO Box 380) Kingsford, 2032 NSW Australia. Telephone: 02-344-9111.

United Kingdom: order from Compusense, Ltd., PO Box 169, London N13 4HT. Telephone: 01-882-0681.

Scandinavia: order from Swedish Electronics hk AB, Murargatan 23-25, Uppsala S-754 37 Sweden. Telephone: 18-25-30-00.

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UniFLEX software prices include maintenance for the first year.

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RMS is a trademark of Washington Computer Services.  
FLEX and UniFLEX are trademarks of TSC.  
OS-9 is a trademark of Microware and Motorola.



ordinary dumb terminal into a crystal ball which allows one to peek into the mysterious time dimension of microsecond and nanoseconds. It is within this strange world that mischievous logic circuits play havoc upon even the most highly structured code. This is something we programmers have suspected for a long time, but were unable to prove, until this amazing device came along. Mr DeFrial, we salute you!

**THE STIMULATION IN ADVERTISING AWARD**

Frank Hogg,  
Frank Hogg Laboratories

Mr. Hogg is well known as a major and innovative 6809 software distributor. By running his now-famous ad of an attractive young lady clad only in a nightgown, Frank Hogg Laboratories has advanced the art of software marketing from its primitive tasteful status quo to the more stimulating and sophisticated techniques employed by big Madison Avenue agencies to sell products such as razor blades, motorcycles, waterbeds, and lite beer. We understand that after this ad hit the streets the phone at Frank Hogg Labs rang off the hook for weeks, but unfortunately most callers wanted the lady's phone number instead of software. But don't worry Frank, if it works for Gillette it will work for you too. Unfortunately, Mr. Hogg is not here to accept his awards as he has a date with you-know-who, so accepting the award in his place will be \_\_\_\_\_.

Saturday the 13th started off at 8:00 a.m. with an audio-visual presentation by Microware. This was followed by indepth classes and demonstrations of Microware software and languages running under the OS-9 disk system. The entire crew from Microware, including Ken Kaplan, attended these sessions and fielded any and all questions, suggestions, and comments from the large group gathered. At times several hundred would be gathered, and each one who desired to be heard was acknowledged. The exchanges were both informative and constructive to all who attended and expressed their impressions to me.

The topics covered during that day were, of course, OS-9 and Basic09. Additionally an OS-9 roundtable, a free discussion period lasting over 2 hours, was heavy in attendance with all getting a chance to say their piece. I attended this session and do not remember any serious negative comments, from any participant. Frankly I was a bit surprised; I have seldom seen this close a working relation between vendor and users before. Everyone had a chance to 'let the hair down', but I saw little if any dandruff. This speaks well for the apparent excellent relationship between Microware and their customers.

The days sessions ended (but not the days activities) with a general language roundtable, again attended by almost all of the Microware crew, including Ken. At this time Microware introduced James McCosh, author of Microware's 'C', and Keith Ashman, who discussed the powerful development language 'Sage'. Both had come from England to attend and field questions and comments concerning their products. By this time the prearranged schedule had 'gone-to-pot' as the OS-9

Users Group who had intended to meet at 5:30 p.m. finally got started sometime after 8:00 p.m., if my memory serves me correct.

Saturday evening the 68 Micro Journal banquet got underway about 5:30 or so. This was a wonderful opportunity for me to say thanks to many there who have supported 68 Micro Journal over the years. I had no intention of giving a pep or sales pitch, just a chance for a lot of old friends to get together. Over 75 gathered, and as we were getting started, Ken Kaplan and Richard Don (Gimix) 'captured' the groups attention by pounding silverware on glasses (seems like it is hard sometimes to get the attention of a group of Standard S50 Busers). Well, to say the VERY LEAST I got a real SURPRISE. There I sat, patting myself on the back for not imposing a 'pitch' on my friends, when these two took control. "What", I thought, "some folks just never let an opportunity pass." About that time the doors opened and in walked a serving crew with a candle lit birthday cake. Ken and Richard led the crowd in singing "Happy Birthday - Dear Don". All I can ever say is thanks Jeanne, Ken, Arlene, Richard and all the others who were in on this well kept secret! The 13th was my birthday, won't say how many. For those of you who know me, it was a rare moment of speechlessness. I was really dumbfounded!! I want to thank everyone for making that one of the nicest moments in my entire life. Despite the fact that not one voice in the crowd seemed to be capable of carrying a tune, yet how sweet it was.

Saturday night extended well into the morning as Joyce and I attended the hospitality suites of MICROWARE, GIMIX, SMOKE SIGNAL BROADCASTING, ACKERMAN DIGITAL and ADVANCED TECHNOLOGY. Regretfully we missed the HAZELWOOD hospitality suite as they were gone to some of others when we called. So went the day.

Sunday started a little late with a brunch hosted by Microware. Afterwards the conference room filled to near capacity as Microware introduced their new OS-9/68000. From the response voiced by potential license prospects and users, the future looks bright. Especially for those who have existing hardware and OS-9 software presently running. It appears that the 'carry-over' from 6809 OS-9 and 68000 OS-9 will be about as painless as it could be done. The 'basic language' (no pun intended) will be 'C'. However, it appears that most all the other high level language source programs will be portable, including Basic09. That means that the present users do not have to hold off their applications software development, they will be able to port it across to the 68000. To me that is one of the more important aspects facing the user who wishes to upgrade. The time and expense can be fatal, in some cases, otherwise.

Following this session, additional discussions were held on the new OS-9 'C'. The 'C' language seems to be making fast inroads in the 6809 community. I suspect it will be the predominant language a couple years hence.

Additional new Microware OS-9 software was presented, including a new  
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A user-oriented, easy to use personal database management system for the TRS-80\* Color Computer with these outstanding features:

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- \* user-definable printer format, for any printer
- \* up to 230 characters per record

Price includes the database management system, full documentation including a reference guide and 1981 Bibliography of Color Computer articles.

Requires 16K Extended Basic. 32K recommended.

## 1982 TIMS Bibliography - \$9.95.



**\$19.95**

The TIMSMAIL mailing list manager has most of the fine features of TIMS as well as these special mailing label features:

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- \* designed for 80 column printer
- \* 1, 2 or 3 labels wide
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- \* select fields to print
- \* select records to print
- \* fast ML search, sort (up to 3 fields) and delete routines

Requires 32K Extended Basic



**\$19.95**

Auto Run is a utility program for the TRS-80\* Extended Basic Color Computer. It is used to add convenience and professionalism to your software.

Auto Run will help you create your title screen with the graphics editor. The graphics editor allows you to choose a background color and border style. Using the arrow keys and several other commands you can draw pictures, block letters and also include text.

Auto Run will generate a machine language loader program to precede your program on the tape. Then, to start up your program, simply type CLOADM to load in the Auto Run loader program, which will then automatically start itself up, display your title screen, load your program and then RUN or EXEC it.

Also you may record a vocal or musical introduction preceding your program. The Auto Run loader will control the audio on/off.

Basic programs can be set to load anywhere in memory above the PCLEAR 0 page.

Software authors: The Auto Run prefix may be appended to your software products.

Price includes complete documentation and assembly source listing.

Requires 16K Extended Basic.

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A great new twist to the popular educational word guessing game for the Color Computer. Large (700 words) and sophisticated vocabulary. Or enter your own words, your child's spelling list, foreign language vocabulary, etc.



Outstanding high resolution graphics, animation and sound effects.

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Color Micro Journal



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**\$19.95**

Disk Version - \$24.95

Disk version with all 62 stories - \$49.95

A sensational and educational version of a popular party game for the TRS-80\* Color Computer... For 1 to 10 players. Load a story into the computer. The players are asked to supply a noun, verb, part of body, celebrity, etc. which the program uses to complete the story. The story, which is displayed when all words are entered, will be hilarious.

Price includes Silly Syntax game, user guide and 2 stories.

Requires 16K Extended Basic (32K for disk).

You can create your own stories or order story tapes from the selection below.

Each story tape is \$9.95.

Silly Syntax stories - Ten stories per tape.

|                      |                           |
|----------------------|---------------------------|
| SS-001 - Fairy Tales | SS-004 - Current Events   |
| SS-002 - Sing Along  | SS-006 - Adventure Sci-Fi |
| SS-003 - X-Rated     | SS-007 - Potpourri        |

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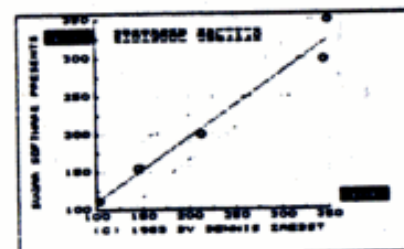
Help your preschool age (3-5) child learn to read with this easy to use menu-driven program. Great high resolution graphics, colors and sound effects. Includes capital and small letters, numbers, shapes and colors, much more! Requires 32K Extended Basic and joysticks.

**NEW**

**STATGRAF \$24.95 Disk - \$29.95**

STATGRAF is a linear regression analysis package combined with sophisticated high resolution plotting/line graphing. Features include: allows entry of up to 250 pairs of (x,y) data, transforms observations using logarithmic, square root, inverse exponential or additive codes, plots any number of data sets on a single graph, type information directly onto the graph in 3 orientations.

Requires 32K Extended Basic.



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### System Requirements

|  |          |
|--|----------|
| <b>FLEX9</b> Special General Version + Editor & Assembler (which normally sell for \$50.00 ea )                    | \$150.00 |
| <b>F-MATE(RS)</b> FLEX9 Conversion Rout. for the RS Disk Controller when purchased with Special General FLEX9 Sys. | \$ 49.95 |
| when purchased without the General FLEX9 Sys.  | \$ 59.95 |
| Color Computer with 64K RAM and EXT.BASIC  | \$399.95 |

### SPECIAL SYSTEM PACKAGES

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|---|----------|
| 64K Radio Shack COLOR COMPUTER Radio Shack COLOR DISK CONTROLLER, a Disk Drive System Special General Version of FLEX9, F-MATE(RS), and a Box of 10 Double Density Diskettes, a COMPLETE ready to run SYSTEM on your Color TV Set | \$999.95 |
| 64K Radio Shack COLOR COMPUTER Radio Shack COLOR DISK CONTROLLER, a Disk Drive System and a Box of 10 Double Density Diskettes, a COMPLETE ready to run SYSTEM on your Color TV Set.  | \$799.95 |

|   |          |
|---|----------|
| Radio Shack Disk Controller                     | \$169.95 |
| 1 Single Sided Double Density Disk Drive Tandon | \$229.95 |
| 1 Double Sided Double Density Disk Drive Qume   | \$319.95 |
| 1 Qume Thinline Double Sided, Double Density    | \$249.95 |
| Single Drive Cabinet with Power Supply          | \$ 79.95 |
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| Single Drive Disk Cable for RS Controller       | \$ 19.95 |

### DISK DRIVE PACKAGES, etc.

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| These Packages include the Radio Shack Disk Controller, Disk Drives with Power Supply and Cabinet, and Disk Drive Cable: |          |
| <b>PAK #1</b> - 1 Single Sided, Double Density Sys.  | \$489.95 |
| <b>PAK #2</b> - 2 Single Sided, Double Density Sys.  | \$749.95 |
| <b>PAK #3</b> - 1 Double Sided, Double Density Sys.  | \$559.95 |
| <b>PAK #4</b> - 2 Double Sided, Double Density Sys.  | \$919.95 |
| <b>PAK #5</b> - 2 Qume Thinline Double Sided, Double Density Sys.  | \$699.95 |
| <b>PAK #6</b> - 2 Tandon Thinline Single Sided, Double Density Sys.  | \$599.95 |

### PRINTERS

|              |          |
|--------------|----------|
| EPSON RX-80  | \$375.00 |
| EPSON MX-100 | \$725.00 |
| EPSON MX-80  | \$395.00 |
| EPSON FX-80  | \$599.00 |

### SERIAL BOARDS

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| MX Series           | \$119.95 |
| RX-FX-Series        | \$ 99.95 |
| Spectrum MX-Series  | \$ 54.95 |
| Mark Data Keyboards | \$ 67.95 |

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|-----------------------------|-----------|----------|
| 5" Soft Sector Disks        |           |          |
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| Single Sided Double Density | \$2.40ea  | \$2.75ea |
| Double Sided Double Density |           | \$4.92ea |
| Plastic Storage Box         |           | \$2.00ea |
| 8" Soft Sector Disks        |           |          |
| Single Sided Single Density |           | \$3.75ea |
| Single Sided Double Density |           | \$4.10ea |
| Double Sided Double Density |           | \$4.75ea |
| Plastic Library Box         |           | \$5.00ea |

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|--|----------|
| Double Drive Disk Cable for RS Controller                        | \$ 24.95 |
| Micro Tech Prods Inc. LOWER CASE ROM Adapter                     | \$ 74.95 |
| Radio Shack BASIC Version 1.1 ROM or 1.2 ROM                     | \$ 34.95 |
| Radio Shack Extended Basic ROM                                   | \$ 74.95 |
| Radio Shack Disk Basic ROM 1.1                                   | \$ 29.95 |
| Screen Clean - Clears Up Video Distortion On Your Color Computer | \$ 39.95 |
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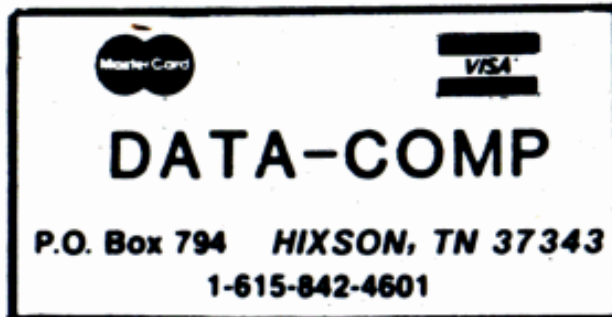
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# Software

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**FLEX™ OS-9™ Color Computer**



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Color Computer Disk - Object Code Only \$49.95

**FORN** Programming Language  
**FORN** is a Forth package tailored to the Color Computer! This package is supplied on Tape, with instructions for transferring it to disk if you wish. Written primarily in machine language, it's speed is unparalleled. A full Semigraphic-8 Editor is provided, along with "goodies" like Graphics and Sound Commands, Printer Commands, Auto-Repet and Control Keys, etc. If you are interested in Learning Forth, a **Trace** Feature is provided which is invaluable. If you are a Forth Pro, this package provides CPU carry flag accessibility, Fast Task Multiplexing, Clean Interrupt Handling, etc. (Or: you won't "out grow" the Basic capabilities of this implementation). Combine this package with Leo Brodie's EXCELLENT Book "Starting FORN", and you will be a Forth Expert before you know it (and have a lot of fun doing it!).  
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An **EXTENDED BASIC** Program that will help you deal with numerous problems regarding interest calculations. Present Value, Rate of Return, Current Bond Yield and Rate of Return to maturity, Loan Repayment Amortization Schedules, etc.  
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**Accts Rec., Accts Payable & Gen Ledger** - A **FULL** Accounting Package that can be used together, or as separate packages; provides the IRS required Audit Tracking. (**XBASIC**, based on the "Osborne Business Programs.")  
FLEX and Color FLEX \$295.00/PROG; UNIFLEX \$395.00/PROG

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**STANDARD** - THE Electronic Speed Sheet for 6809 Computer System. An extremely **POWERFUL** Business Tool, this Program will find an unlimited number of "non-business" applications, also (for example, I have just finished setting up a Full Junior College Electronics Curriculum using **STANDARD**). Advanced features like "Table Lookup" make income Tax work easy. **Color** or Row Sorting for numerous applications; etc. Completely "Memory Resident", Machine Language, this Program is **FAST**. Provides **STANDARD** FLEX Test File output for use with **BASIC**, Word Processors, Pascal, "C", etc.  
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Westchester Applied Business Systems **XBASIC** Data Management System. Possibly one of the most powerful **DISK**'s available, this machine language program is small enough to operate on a single sided 5" disk, yet provides the speed of **BASIC**, and power limited only by the user's imagination. Supports Sequential, Hierarchical, and Random Access File Structures, and has Virtual Memory capabilities for those Giant Data Bases. Easy-to-use English Language Command Structure.  
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**UNIVERSAL DATA MANAGER INC.** - Note: ALL Accounting and DBM Progs. Require FLEX and **XBASIC**. These are Time Tested programs from an old, established, software house for Color FLEX Systems.  
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Church Contributions - \$49.95; Single Entry Gen Ledger - \$49.95; Balanced Billing System - \$49.95

**Integrated Software for Color FLEX**  
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FLEX and Color FLEX - Each program \$25.00

**COPYCAT** - (Pascal NOT required) Allows reading the Mini-FLEX, IBM DOS/2.0, and Digital Research CP/M disks while operating under FLEX 1.0, FLEX 2.0, or FLEX 3.0 with 6809 or 6809 Systems. **COPYCAT** will not perform miracles, but, between the program and the manual, you stand a good chance of accomplishing a miracle. Includes Utilities to List Directories, Copy Files, and convert Text Files when required. Also includes a Utility for Investigating Physical Compatibility problems. Programs supplied in Modular Source Code to make it easier to solve unusual problems.  
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FLEX and Color FLEX \$79.95

**COPYFILE.CMD** - Copy LARGE Disks to several smaller disks -  
The following FLEX utilities allow the backup of ANY disk to any **SMALLER** size diskettes (Minichester to 8's or 5's, 8" to 5's, etc.). By simply inserting diskettes as requested by **COPYFILE**, a large disk system may be downloaded to your present floppy disk system, any size. No need to fiddle with directory deletions or any of the other tedious operations that must be done using the normal copy routines.  
**COPYFILE.CMD** understands normal "copy" syntax and always keeps up with files already copied by maintaining directories for both host and receiving disk system, eliminating hours of tedious keyboard entries and other time consuming cleanup chores.

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Sex, Age, Height, Present Weight, Frame Size, Activity Level and Basal Metabolic Rate for normal individual are taken into account. Ideal weight and sustaining calories for any weight of the above individual are calculated. When a weight goal is given (either gain or loss), and a calorie plan is agreed upon between the computer and the individual, the number of days to reach the weight goal is projected. The starting and ending rate of weight loss is calculated, and a daily calendar with each day's weight for a 30-day period is printed.  
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**UNIFLEX** - Multi-User, Multi-Tasking with FLEX  
**SouthEast Media** is now shipping **UNIFLEX** **PROG** **BOOK** - the multi-user, multi-tasking capability of **UNIFLEX** allows FLEX users the advantages of core exploitation and time saving computer usage without having to buy or learn a new language or Operating System system. **UNIFLEX**, as its name implies, allows true "time-sharing" operation under the popular FLEX operating system, and also allows each user to run two simultaneous jobs (multi-tasking), even on single-user systems. For example, while in **EDIT**, you can list another file or examine a directory. Or, you might look up an item in a Data Base while a sort is in progress. **UNIFLEX** also provides some fringe benefits that will be greatly appreciated by FLEX users, including time-shared, command line editing, and instant responses to "escape".  
**UNIFLEX** is the painless method to use your existing FLEX computer by simply adding 64K of RAM for each user. First, if you still use FLEX just like you always have, **UNIFLEX** is not intended as competition to **UNIFLEX**. It does not improve on the speed of FLEX, and does not offer password protection or other features of a full-blown multi-user system. **UNIFLEX** does do is give FLEX users a low-cost way to use existing software in a multi-user, multi-tasking environment, so your existing FLEX versions of **BASIC**, **XBASIC**, editors, assemblers, disassemblers, sort/sort packages, word processors, compilers, **DISKCALC** spreadsheet packages, and so on are still good.  
**NOTE** - The initial releases of **UNIFLEX** is for **IMPROM** 8/09 Computers, but versions will also be available for other popular extended-memory (up to 128K) systems, such as **HELEX** and **GENEX**. A minimum of 128K of RAM will be required with ALL versions. **UNIFLEX** requires 64K of RAM for each active task; thus a 256K system could allow foreground-background operation on two terminals, or foreground-only operation on four terminals.  
**UNIFLEX** **PROG** **BOOK** - \$299.00

**UNIFLEX** - Multi-User, Multi-Tasking with FLEX  
FLEX - UNIFLEX - OS-9 - Color Computer

For the past several months, we at the **SouthEast Media Division of Computer Publishing, Inc.** (CPU), the parent company of "68" **MICRO JOURNAL** and **OS-9** **MICRO JOURNAL**, have debated expanding our software distribution business. Many other magazines have been doing so for years (in fact, **NOT** were in the software distribution business **BEFORE** they began to publish a magazine). Recently there has been a lot of talk about software that has been developed by VCL, our readers, that will cover the "light of day" due to the cost of Advertising and TIME and cost involved in the production, distribution, and Customer SUPPORT of that software unless **SOFTWARE**, with enough exposure and the willingness to continually advertise, runs with the ball.

Software is the "backbone" for the **REAL** utilization of any Computer System, and ours are no exception! This has been no simple decision. While we realize that there could be some conflict with some of our advertisers, we **ALSO** have a **LOUD** and **CONTINUOUS** cry for **HELP** from our readers. From day one, the **SouthEast Media Division** has been it's **OWNERS**. Therefore, our **SouthEast Media Division** will accept, for approval for possible Distribution, 6809 software **GENEX**, Utilities, Software Development, Business Application Programs, etc.  
In the past there has been too much software offered that was not quite ready. We will strive to eliminate that element. But, right up front, we tell you only that we will do our very best; nothing more. Also, we will strive to keep cost to a bare minimum, while securing for the author a fair return in royalty payments, promptly paid, and in customer support for his product.

Of course, we will expect, no - **DEMAND**, that the author keep the product free of errors (bugs), and maintain it in a prompt and business like manner. Also we shall require that authors be willing to furnish "source" for those programs that justify, by price and utility, inclusion of same. The lack of source code, properly commented, is a continual complaint we hear. But all programs will be sold with source, but where necessary, we will insist that it be included.  
In some instances the program may be small or short and not justify itself as a "single" sale product. In this event it will be combined with other like programs, and offered as a package. In that event, the royalties will be split between the various authors.

If you have software that you feel will qualify under this program, please contact one of the people below. Remember, if your software has any problems or "bugs" - **GET IT FIXED BEFORE YOU CONTACT US!** Also get your source code in proper shape and well commented; there is too much 99% code already drifting around.

If your software is **NEW** contact: Bob Day, Don Williams, or Tom Williams  
**SouthEast Media** is a division of Computer Publishing, Inc. (CPU),  
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relocatable macro assembler, extended utilities, and a level II print spooling system.

Later Sunday afternoon presentations were made on behalf of the 'SAGE Applications Generator System', CANDID LOGIC INC.'s, MICRO INTERNATIONAL, EUROMAK COMPUTER SYSTEMS, KEMTRONIX LTD, LEARNING VENTURES, UNISOFT (TMP) and Brian Capouch's programs and systems. This went on until the hall closed about 6:00 p.m.

Monday morning the Microware crew reassembled and again individual questions and problems were discussed with many (few had departed) attending. At no time did it ever appear that Microware failed to meet head-on and reply to all questions, comments and problems. This was commented on many times by users I talked to. They were both impressed and grateful that Microware took sufficient time to listen and respond in depth to all.

Monday afternoon was spent by all being invited to the Microware 'Works' for a tour of the facilities, which Microware will be vacating soon for much larger and newer quarters. As for the 'boss' and I we piled in the heap and headed home to the hills of Tennessee. The drive back was pleasant and enjoyable, despite the 19 hours of steady driving. All in all it was a very pleasant and educational four days.

#### OS-9 and Radio Shack

While we were at the Microware shindig, Tandy-Radio Shack released the official word (via mailed catalog) of the availability of Microware's OS-9 disk

system for the present Color Computer. It will sell for \$69.95 on disk with one of the better 'how to' manuals on OS-9. It comes complete, at this price, with editor, assembler and debugger. The standard, full feature Microware Basic09 is also available for \$99.95. Dale Puckett, newly elected president of the OS-9 Users Group, has written a very informative book on how to use Basic09 that will be available soon.

While on the subject of the OS-9 Users Group, our very own Peter Dibble was elected vice-president. Congratulations to Dale, Peter and all the other incoming officers. Also our thanks to Brian Capouch and his officers for their efforts this past year on behalf of the OS-9 Users Group. The close cooperation between Microware and the Users Group can only strengthen the bonds already established.

The decision by Radio Shack to adopt the Microware S-9 disk system for their products, speaks well of things to come. With nearly a half million of Color Computers out there, and all now capable of running a full blown multi-user, multi-tasking disk system, literally blows the mind. The potential for the software and add-on market is counted in the millions, real spendable dollars that is. Like I said back when most everyone, including Radio Shack, was derating the Color Computer, it had potential that even the designers overlooked. Manufacturers and publishers alike, who just a few months ago were belittling the CoCo, now are madly scrambling to climb aboard. Microware picked a plump plum there!!! And we were telling you about the latent power just waiting to be exposed, since day one.

Also while at the seminar I was gratified with the response our new COLOR MICRO JOURNAL has received. Seems that our basic goals carry over to Color Micro Journal also. We never have pretended to be a 'slick'. Fact is we went from slick paper to a duller matted paper because too many complained about the glare from slick paper while attempting to copy one of the many source listings from 68 Micro Journal. Also we have published more articles, words or what have you, concerning the Standard S50 Bus and the 68XX series of computer devices, than all the other magazines combined! And we intend to continue to lead. Maybe we won't have a lot of cartoons, space wasting headers and all the other ploys that publishers and editors do to grab your attention. Never had them and never will (as the ad goes). What we have had and will continue to have is gut level information that allows you, our readers, to gain the most from your 68XX computer. At times some of it is small or hard to read, but we have so much to try to offer you that other magazines would just not mess with, we print it. Knowing that it is valuable to many of you and if we didn't print it - no one would. Far better than 'file 13'. So will be the format of COLOR MICRO JOURNAL also.

I am convinced of this more strongly after our initial release of issue one this past month. We reached more than 30,000 - RIGHT - more than 30,000 readers with the first issue. And now with our background and firm footing in the 6809 world, COLOR MICRO JOURNAL will soon be a leading force in specialty publishing.

An important aspect is that many users will find that there are some built-in limitations in the Color Computer, but having invested time and precious dollars in a Color Computer and OS-9 software, they will, by necessity, want to upgrade to more expandable 6809 computers. That alone will expand the potential market of our present advertisers many thousand fold, especially those catering to the OS-9 marketplace. Back when other publishers ignored the 68XX market, we kept the faith, along with all of you. As the community prospers, in the future, the spillover will reward us all. You will have a choice of more and better products. A large support and user base makes for better and less costly goods. Our market is no different. And our experience and qualifications will enhance both 68 MICRO JOURNAL and COLOR MICRO JOURNAL. Which means that with time we can serve you better. And that has been my goal since we first published, more than five years ago.

As the months pass you will find that 68 MICRO JOURNAL will cater more to the Standard S50 Bus and the growing 68000 users base. COLOR MICRO JOURNAL will direct it's efforts more to the other 6809 systems (more are on the way). There will be some duplication in each publications, however, both will direct it's efforts to a different readership. Readers and advertisers alike will be offered, in the near future, combined incentives to avail themselves to both markets, at reduced rates.

We believe that we return more of our gross income, percentage wise, to our publications, than any other publishing endeavor. In the past ours has been a small market, however, I expect things to change. As we grow, so will our size and content; both in volume and quality.

I sincerely believe that the adoption of Microware's OS-9 disk system and languages is a major event of tremendous proportions in the 6809 community. Ours has been a QUALITY base since the beginning, as compared to what the others have offered. Sometimes we have fallen a little behind but we always come back. This is another of those times and EVERY one connected with the 6809 community stand to gain; EVERYONE.

From the very earliest days when there was primarily Southwest Technical Products and TSC to look to for support, we survived; mainly because they were there and supplying state-of-the-art products. Without that support we would not have survived as a group. We are where we are today because they delivered. We all owe them a large debt of gratitude. As the years passed and others joined, things improved. We had wider choices and support.

I have not forgotten, and I sincerely hope that you won't either. Our choices are expanding and that is a sure sign of progress and prosperity.

I hope that all of us, readers and advertisers alike will prosper as we more define our market aims, in the coming months. We, 68 MICRO JOURNAL and COLOR MICRO JOURNAL, as well as S.E. Media and Data-Comp, sincerely THANK YOU for all the support in the past, and look forward to the future; together.

DMW

Color Micro Journal



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# Color Computer

## 64K RAM Mod

When I first became aware of the hidden built in features of the Radio Shack Color computer, it was of interest that the computer could be up graded with 64K memory at a minimum expense. At first I could see no reason for doing this. I asked the obvious questions like who needs 64K RAM or 96K RAM? I resisted the upgrade, but with 64K RAMS now available for less than \$10 each it became a real possibility.

A few months ago I heard through the rumor mill that the FLEX disk operation system will be available for the TRS-80C but it will require 64K to make it operational. This was the final straw and I knew that I must upgrade. Earlier this year two articles appeared in two magazines. After reading two articles in the 68 Micro Journal (ref 1) and 80 Microcomputing (ref 2) it became very obvious that updating the TRS-80C to 64K was possible, but the two articles painted a rather confused picture of what had to be done. Each article presented a part of the overall picture and I decided to use their ideas but make my own slight twist.

I decided to make the mod as clean as possible with all wiring below the PC board. This means the mod cannot be backed out. After all who would want to do that. If your computer has 64K and has less power drain why would you want to back out the change? My change requires the cutting of lands and involves a little more work than the other magazine articles. But the net result is cleaner, and looks more professional.

### TRS-80C PC BOARD LEVEL

The first decision process is to see what level your machine is. This is very simple. You could look for the part number on the PC board and see if it has a suffix letter. But the easiest method is to look to see how many shorting bars are on the PC board. If you have only two your computer is pre E revision. If you have seven it is the E revision. If your board is a E revision you will have to swap some jumpers and make only the revision which deselection the ROMS. If your board is a non E revision make all the following steps. I included a diagram of the jumpers on a E revision board to allow for jumpering (Fig 1). It is also advisable to remove the bypass caps \*(8 ea.) if you plan to modify an E level board.

### 1. VOLTAGES ON THE RAMS

The first step is to remove the 4K or 16K rams from your PC board. Next remove the PC board and the ground shield on the bottom of the board. Now obtain a sharp knife and a soldering iron. You will also need a 74LS138 IC a 33 ohm resistor and a socket. If you do not have BASIC revision 1.1 don't start on the mod. Obtain one, it is required! The first modification removes some excess caps and applies the correct voltages on the 64K devices.

This is accomplished by cutting lands and adding one jumper. Look at the Figure 2 for details. This diagram shows the differences between the 64K and 16K RAM IC's. This modification will remove the plus 12 volts from pin 8 and place 5 volts on pin 8. The wire land connected to pin 9 will be used to select the A7 address bit for the chip selection.

The land connected to pin 9 will be connected to the SAM 6883 IC.

On the top side of the board first cut out eight capacitors with sharp dikes \*(C61, C31, C64, C35, C67, C48, C70 & C45). These IC were used to bypass the plus five volts.

Next cut the plus 5 and plus 12 volts lands and add a jumper. This will place the correct potential on the RAMS. If your 64K RAMS are the 3764 (OKI) then the minus five volt land should be cut going to pin 1 of the IC's.

If your RAMS require plus 5 volts on pin 1 add another jumper.

### 2. ADDRESS A7 to 64K RAMS

Now you must make a basic decision. Do you want the mod to look professional, or do you want it to look sloppy. I'll describe the clean professional method. All wiring is under the PC board.

On the top side of the board connect a 33 ohm resistor to pin 35 of the 6883 IC. The simplest method is to solder directly to the IC pin. Extend the resistor lead with a short piece of small wire, approximately 30 gauge. From the bottom side of the board solder suck one cut end of a capacitor that was cut out. Solder the wire to the plated through hole in the PC board. With a ohm meter insure that pin 35 of the 6883 is really connected to pin 9 of the RAM IC's through a 33 ohm resistor. Also insure that all caps have been removed.

### 3. MEMORY SIZE JUMPER

You will next have to provide a jumper from one PIA to another will allow the BASIC ROM (Ver 1.1 only) to know that your machine is really 32 or 64K.

On the rear side of the board add a jumper or small wire from pin 17 of U8 (6821) to pin 12 of U4 (6821).

### 4. DESELECTION OF THE INTERNAL ROMS

If you wish to allow the upper 32K of the RAMS to be used it is necessary to allow the ROMS to be switched out of the computer by software. This is tricky and will require some special software to take its place when you make the change. The FLEX disk operating system will do this. A schematic of this change is in Figure 3.

First remove IC U11 (74LS138) from the PC board. If it is soldered in cut it out. If it is socketed cut out the socket. This is necessary because pin 5 is shorted to ground under the IC. When this is done and the pins are cleaned up, cut the ground on the top side of the board. Add another socket and a 74LS138 and everything is normal. Next cut the grounds lands on pins 5 and 6 of U29 (74LS02). This will give you a free NOR gate on the 74LS02. Add three small wires from TP1 (R/W) to pin 5 of the 74LS02 and jumper pins 6 and 8 of the 74LS02. Next run a wire from pin 4 of the 74LS02 to pin 5 of the 74LS138 (U11). That the mod it sure isn't too difficult.

### CHECKOUT

The last step is to make sure that everything was done correctly. Spend at least 15 min checking and re-checking all your connections. It could be very costly if you blowout some very expensive IC's. Radio Shack will not repair the unit, they will charge you for a new PC board.

Power up the unit when you get enough nerve, if it doesn't smoke and the familiar display is on the screen, type PRINT MEM. You should have approximately 24K or more RAM.

So good luck. If you migrate up to FLEX or OS9 you will have a very powerful computer as good as many expensive Z80 CPM systems.

I now have the FLEX DOS operating on a TRS 80C. The possibilities are endless. I have found that I can run all of my 6809 software which runs on my big system like Pascal, Text Processors, Basic Compilers and other programs. The TRS-80C has now joined the world of big computer. By the time this article is published the list price of a 4K TRS-80C should be \$299. Not bad for a small home computer. Add the 64 RAM chips and for less than \$400 you can have a 64K computer.

Ref 1 - 32K RAM For Free, 68 Micro Journal, February 1982, by: Frank Hogg  
Ref 2 - RAM Wars, 80 Microcomputing, March 1982, by: Shawn A. McClenahn

FIGURE 1

TRS 80C JUMPERS E REVISION BOARD

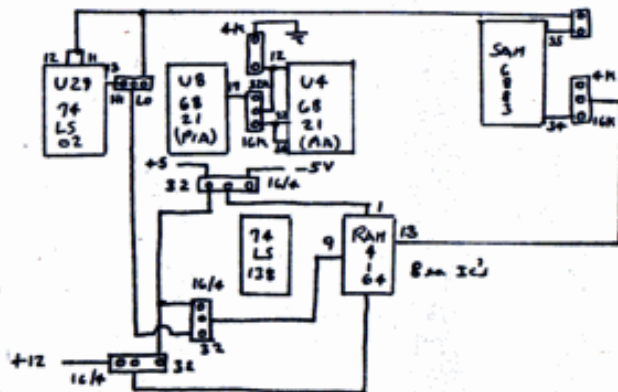


FIGURE 2

TRS 80C LAND MODIFICATIONS D REVISION OR EARLIER REVISIONS

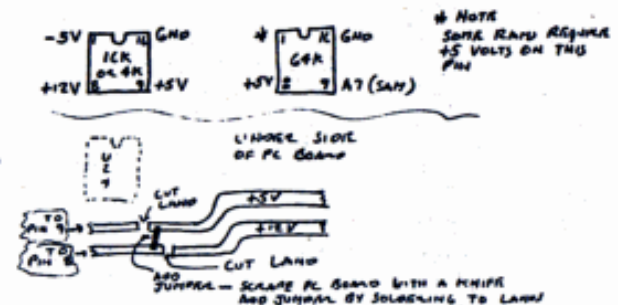


FIGURE 3

DESELECTION OF INTERNAL ROM'S, ALL LEVEL PC BOARDS



BY: Clayton W. Abrams



# XDMS -

## the time saver...

If you're ready to really get some use out of your CoCo - Then it's time for XDMS! The XDMS Data Management System is designed to allow quick and easy file definition, update and processing - All without programming! It will handle anything from bowling scores to inventory and can produce reports, inquiry, forms, screen and file output.

Multi-step processing is controlled by English-like statements, either interactively or from a file. (This is MUCH more flexible than menu driven systems.) Complex functions, such as file merging, generation and summation of arrays, line calculations, subtotalling, selection, etc, are easily accomplished with "results oriented" instructions.

Once installed, you will find XDMS applicable to a wide variety of uses. (You may even wonder why others bother with specific application programs when XDMS does it all!) So put the joysticks aside, load in XDMS, and get some real use out of your CoCo - It's time has come...

XDMS Data Management System (5" or 8" disk) . . . . . \$179.95  
XDMS+ Data Management System with DMS Utilities . . . . . \$249.95

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All software is written in macro/assembler and runs under 6809 FLEX. CoCo users will need F-MATES or FHL FLEX, 64K RAM and 1-2 disk drives. Terms: Check, Money Order, Visa or Mastercharge. Shipment first Class. Add P&H \$2.50 (\$7.50 Foreign). N.Y. Res add sales tax. Specify 5 or 8". Sales: Southeast Media 800-338-6800 Consultation: 914-941-3552 eves.

FLEX is a trademark of Technical Systems Consultants, Inc.



## COMPILER EVALUATION SERVICES

By: Ron Anderson

The S.E. MEDIA Division of Computer Publishing Inc., is offering the following

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Due to the constant and rapid updating and enhancement of numerous compilers, and the different utility, appeal, speed, level of communication, memory usage, etc., of different compilers, the following services are now being offered with periodic updates.

This service, with updates, will allow you who are wary or confused by the various claims of compiler vendors, an opportunity to review comparisons, comments, benchmarks, etc., concerning the many different compilers on the market, for the 6809 micro-computer. Thus the savings could far offset the small cost of this service.

Many have purchased compilers and then discovered that the particular compiler purchased either is not the most efficient for their purposes or does not contain features necessary for their application. Thus the added expense of purchasing additional compiler(s) or not being able to fully utilize the advantages of high level language compilers becomes too expensive.

The following COMPILERS are reviewed initially, more will be reviewed, compared and benchmarked as they become available to the author:

PASCAL "C" GSPL WHIMISCAL PL/9

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615 842-4601

## GEOGRAPHY

## PAC

The most recent bad news affecting us as a nation on a long-term basis is that our educational system is failing. Compared to some other industrial nations, the U.S. is not bringing into the adult world a well trained individual who can adjust quickly to the changing job environment, much less function effectively in a competitive situation. The warnings signals are clear, and we will suffer for it if changes are not made quickly.

Educators can argue all they please about the correct solutions that are needed in the school systems to rectify the problem, but I don't see them doing anything substantial real soon. Why? Obviously, there is too much politics, not enough money, seniority (tenure) eliminates any desire to stay "up with the times", and fear of change, that control the public systems. Blatant failure on the part of students entering the adult world will cause many systems to change quickly. Some will make the necessary changes to reverse the present trend and move forward, while others will introduce some theoretical ideas for helping the students, and find very shortly something is still missing. What? What will they find missing, the Basics. Yes, the fundamental basics of reading, writing, comprehension of the first two and of course math and science skills.

Well this all sounds pretty complicated! Well it is! How is this article going to help? Well, there is no doubt that the computer is the tool of the future, and many schools and parents are recognizing that fact. Also, I believe the Color Computer to be the best all around purchase for people who must watch their budgets. There is lot of software floating around out there that is priced just right, that does not fool you with marketing magic, and is probably the thing your looking for to help a learning individual gain an advantage on the learning process. The Color Computer can assist the learning process by reinforcing the basics in education through good software. The Color Computer is powerful enough to allow programmers of educational software to be very accurate and detailing in their programs. The computer will not grow tired of a student giving the wrong answer.

A good educational piece of software will ask good questions on the very basics of subjects. It will have the ability to become more difficult as the student gains knowledge, and will challenge the students abilities as needed. These articles will help you spot the good stuff without you having to take a chance. My articles are not going to try to put forth any great theories of mass education or doctrines of better learning, or any other types of confusing thoughts that seem to depress you rather than help things. You see, I believe that no matter what is happening in the school, if I as a parent can watch with

care my childrens progress in school (and I don't mean just looking at a report card every nine weeks or so), I can attempt to help in areas where the school system as a whole, or maybe the individual teacher, failed to pass on to my children the necessary tools for development. The Color Computer just happens to be one of the greatest tools for me and my children to accomplish these basic goals in education. The Color Computer, and available software, will save both me and my children time in the learning process. Another benefit, other than the time savings, the Color Computer can bring is that the Color Computer is powerful, exciting and able to handle a multiple of operating systems that allow me access to more software collectively than any other single personal home computer on the market.

I will be reviewing computer educational software for the Radio Shack Color Computer. I will try to describe how it works, how it does not work, and if it IS what some advertisements or marketing procedures accurately describe, it's ability to help a student (is it worth the money).

I openly invite anyone to criticize what I have to say on any subject I review or talk about. I invite any person or company to submit educational software for review. Don't hesitate to send your letters or software. While my schedule is always under pressure, I will attempt to answer all letters and, as quickly as is humanly possible, review all software submitted. Please! Take note that I am a firm believer that anything worth saying, is worth writing down. So, please do not call me on the phone to either argue or praise any article. However, I appreciate phone calls that can pass along important information or facts affecting educational software or the microcomputer industry when a letter is too slow or cumbersome for the intended results.

GEOGRAPHY PAC  
from  
SPECTRAL ASSOCIATES  
3416 S. 90th  
Tacoma, WA 98409

16K Ext. BASIC, Tape \$33.95  
32K Ext. BASIC, Disk \$37.95

Let me start by saying that SPECTRAL ASSOCIATES has a great piece of software in **Geography Pac**. Wayne Thume, Virgil Hall and others did a fine job in programming this educational software.

**Geography Pac** is an enjoyable, easy way to learn geography. **Geography Pac** is a collection of five Extended Basic programs designed to teach the topological location of countries (or states), their capital, largest non-capital city, major industry, and currency (or statehood date). A four-color high resolution map is used. A separate program for the U.S., Europe, Asia, Africa, and South/Central America is available separately or together as the **Geography Pac** on cassette with good directions for transferring to disk.

A 16K Color Computer with extended Basic is required.

**NOTE:** All programs will work in 32K and 64K machines, but none will work in 16K Disk. You must have at least 32K if you are running Disk.



**Geography Pac**, once loaded and running, comes up with a map of the USA. A choice of taking the "FLASH TEST" is given. I did not wish to take the Flash Test at first. Once I responded with a N on the keyboard I was asked

"How Many States Would You Like: 50?"

Use your up and down arrows on the keyboard to change the number of states desired. After doing this the screen asks

"What Type of Questions Would You Like:"

- A. States Only
- B. All Questions
- C. Random
- D. Capital
- E. Industry
- F. Cities
- G. Statehood

In choosing "A. States Only" the four-color map reappears with the state to be named flashing for a few seconds in a different color. When ready to name the state you simply hit return and

"Type the Name of This State"

appears on the screen at which time you give it a try. If the name is misspelled or just flatly named wrong, a little tune is played and the correct answer is displayed on the screen.

"Press Space Bar To Continue"

if you have asked for more than one state.

If you had selected B under Types of Questions, you will be asked

"All Questions".

- Name of State
- Capital
- Major Industry
- Statehood Date
- Largest Non-Capital City

All other selections under types of questions are as they read.

A percentage score is given upon completion of each section. A choice of either playing again or stopping is given.

When using "FLASH TEST" you are asked if you would like a "SLOW", "MEDIUM" or "FAST" Flash. The map of the USA is shown with the state in question flashing.

Depending upon your choice of speed, the outline of the USA and state disappear from the screen and you are asked to name that state. You have got to be quick and good. A percentage score is given, and the opportunity to play again is given.

**Geography Pac** rates very well on my list of good educational software. **GEOGRAPHY PAC** meets several important features of good educational software. **GEOGRAPHY PAC** is informative, challenging, powerful, simple or sophisticated (your choice), enjoyable and easy to use. There is nothing complicated about **Geography Pac**. It is straight forward and well worth the investment. Another great feature of **Geography Pac** is that it can be used by 1st graders through adults.

The only criticism of **Geography Pac** that I found was in the instructions for transferring to disk; step #3 had a misprint and should read,

**CLOADM "AFRMAP", &H800** enter.

Also there are a few bugs in the programs where you are asked to give a statehood date. Two places when entering the statehood date, the date would not be accepted by the computer. This was only a minor problem as I listed the program out and made the correction in the listing myself. Current versions of **Geography Pac** should not have these bugs. This piece of educational software, "**GEOGRAPHY PAC**", passes the test easily with very high marks.

Larry E. Williams

**COCOPRO**  
P. O. Box 37022  
St. Louis, MO 63141

NEW PRODUCT RELEASE

**Dual Cassette Copy System**

Emerald Systems and Program Products team up to produce the ultimate cassette tape copy system.

Two cassette tape recorders are used with your TRS-80C Color Computer. The Color Computer LOADS from one cassette recorder and SAVES to the other under the control of unique and powerful machine language software.

You can copy cassette tapes without the tedium and frustration of changing cassettes after each program is LOADED or SAVED. DCCS will start copying with the first file encountered or at a specified file name. DCCS will automatically adjust to your memory size up to 64k and display the amount of memory remaining when LOADING programs. You can select 1 to 9 copies of each program. You can even force it to copy a file that has a tape read error.

DCCS is a simple to use menu driven copy program. The default modes will copy each file encountered on the first cassette one time onto the second cassette. Normally, files with errors will be bypassed. As files are read and copied, a directory is generated on the screen showing the length of Basic programs and data files and the start, end, and transfer address of machine language programs. A blank leader of eight seconds duration is automatically placed between all files recorded.

From the menu, you can change the number of copies to be made, select that the copying begin at a specified filename, and force copying of files with tape read errors. While the copying is underway you can enter a keyboard character which will cause the operation to pause at the next possible step without aborting the ongoing procedure.

Includes program on cassette, motor control adapter cable for the second cassette recorder, and complete instructions.

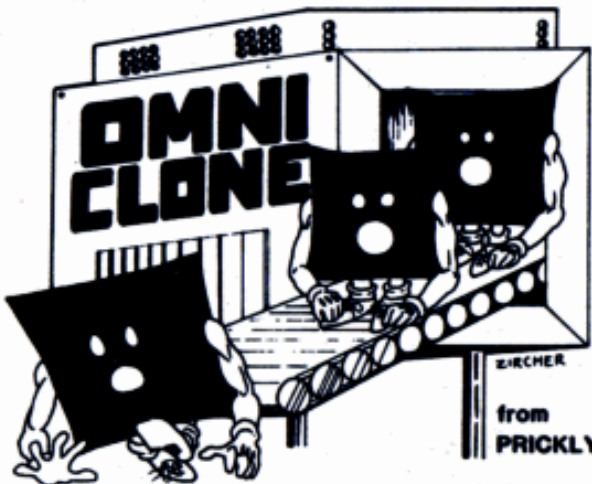
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If you have a disk drive, you know how important it is to back up your disks. Virtually every book on computers tells you to back everything up, and many recommend at least two backups. That is simply good computer practice. However, the BACKUP command on the color computer will only handle disks with a standard format, so many disks could not be backed up.

Enter **OMNI CLONE**. This amazing program handles most any non-standard disk with ease. It handles variable sector lengths, non-standard sector and track addresses, deleted address marks, forced CRC errors, un-formatted tracks, any amount of sectors, any number of tracks (up to 80), and single or double density. **OMNI CLONE** is 100% machine language, and it is completely self-contained. It has its own disk drivers and keyboard scan. It uses no ROM calls at all.

Unlike many programs of this type, you don't need to know anything about the disk you want to clone. **OMNI CLONE** does it all for you, including the formatting of the destination disk, and it's all automatic. Don't ever be caught without a backup again! We can't promise that **OMNI CLONE** will back up any color computer disk, but we haven't found any yet that it can't handle. It has even backed up some Model III disks!! **OMNI CLONE** can be used with either one or two drives and requires 32K to run.

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## REVIEW

**ROMBACK**  
from  
**SOFT CITY**  
442 SUNNYSIDE  
WHEATON, ILL. 60187

Tape \$16.95

**ROMBACK** is a utility for a 64K CoCo from **Skyline Marketing** on cassette. It makes cassette backup copies of ROM Packs. Disk copies can then be made. The instructions are complete and easy to follow, even giving "POKES" for MICROBES, SPECTACULAR (which adds another 8K storage), MICROPainter, BASIC AID, and MEGABUG, to bypass protection. It also displays beginning, end, and execute addresses on the screen in HEX to use in "SAVER" commands for Disk copy. A screen prompt asks you for a filename, and if you are ready for the copy to the cassette.

You must tape over pin 8 on the ROMPAK before you plug it in and power up CoCo. **ROMBACK** then checks the size of ROMPAK memory, and adds a special loader program that executes the Copied Program when you enter "EXEC" after loading the Taped Copy, which loads and runs it in high memory.

RUSSELL ROBERTS  
CHATTANOOGA CHOO-CHOO SOFTWARE

## >>> HELPFUL HINT <<<

### User Defined Functions in BASIC

**Extended Color BASIC** includes the ability to create **USER Defined Functions** by using the "DEF FN" Statement. A User Defined Function can be used just like a System Supplied Function (such as SQR).

One way to use a User Defined Function is to add new 'statements' to BASIC. As an example, I had always wanted a 'DPEEK' statement to read the contents of two bytes from memory.

To define a function to do this, we could use the code;

```
10 DEF FND(A)=PEEK(A)*256+PEEK(A+1)
at the beginning of a program.
```

We could then use this function to determine the **Current Cursor Location** on our Text Screen. The cursor address is stored in locations \$88 and \$89, which contain an address in the range \$400 thru \$5FF.

```
100 CL=FND(&H88)-&H400
```

There are many other uses for User Defined Functions. If you come up with any, share them with the rest of us who read the **Color Micro Journal**.

Troy Brumley

## REVIEW

**WIZARD 64**  
by Chris Hawks

Distributed by  
**SKYLINE SOFTWARE**  
442 Sunnyside  
Wheaton, IL. 60187

Requires **64K Extended BASIC**  
Tape \$21.95; Disk \$23.95

This is a combination of **Two 32K BASIC Programs**, **WIZARD'S TOMB** Part One and Part Two. The Disk Version I tested came with only a single page of instructions, which said to type "RUN WIZARD64", and little more. The program, once loaded and run, leaves less than 4K of memory, so a true 64K machine is necessary. **WIZARD 64** is a Text-type Adventure which has graphics pages to add interest. The program allows only single letter commands to be entered, so your actions are somewhat limited.

The program begins by giving you a brief background on why you are here and what you will encounter. Then you are asked for your name and how many players there are (there can be up to four). You are then asked for the other player's names. Be sure you remember how you spell the name you use, because the program will not take anything except the initial spelling. Then you will be assigned life and ability points; if either of these reach zero, you will be **DEAD!** These points are sometimes quite low, so be careful; each fight brings you closer to death, and there is no way to renew them. At last you are conducted to the Inn and told to equip yourself from the list of items, but you can only carry three. Choose carefully!

You are shown a map of the countryside (no indication of where you are), and ask which direction you want to start in. As you go toward the Wizard's Tower, you encounter various monsters which you must fight; no evasion is allowed. If you are lucky, you will reach the Tower and gain entry. Once inside, you must search for the Wizard's Tomb. This is where the first adventure apparently ends, but in **WIZARD 64** there is no treasure here, so you must find your way on down into the lower catacombs. On the lowest level, you will find the Wizard's treasure; then you must find your way back out again. There are treasures and monsters a-plenty along the way. Oh; one other thing! You aren't allowed to **LEAVE** until the Wizard's treasure **IS** found.

**WIZARD 64** is an interesting game for the Text Adventure fan, but will not hold great interest for those who want Graphics; there are only three pages for fights and the map. The game is well thought out, and will keep you guessing until the last, as the room descriptions on different levels are identical; but you will not always get the same results from the same actions. After the game is loaded, it calls a Machine Language program that sets up two memory pages, moves the first program, and loads the second. This is an excellent ML routine for those with 64K, as it allows loading much larger BASIC Programs. The possibilities are unlimited, so try the game and enjoy it.

Joe Patrick

Color Micro Journal

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| Individual connectors           | 7.95    | <del>9.95</del>    |
| <b>COCO Disk Module (2)</b>     | 16.95   | <del>18.95</del>   |
| Ground tab extensions           | INCL    | <del>1.00</del>    |
| Disk Drives (all R.S.)          | 7.95    | <del>9.95</del>    |
| Gold Disk Cable 2 Drive         |         | 29.95              |
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# SYSTEMS SOFTWARE

## SOFTWARE DEVELOPMENT SYSTEM

The Micro Works Software Development System (SDS80C) is a complete 6809 editor, assembler and monitor package contained in one Color Computer program pack! Vastly superior to RAM-based assemblers/editors, the SDS80C is non-volatile, meaning that if your application program bombs, it can't destroy your editor/assembler. Plus it leaves almost all of 16K or 32K RAM free for your program. Since all three programs, editor, assembler and monitor are co-resident, we eliminate tedious program loading when going back and forth from editing to assembly and debugging!

The powerful screen-oriented Editor features finds, changes, moves, copies and much more. All keys have convenient auto repeat (typematic), and since no line numbers are required, the full width of the screen may be used to generate well commented code.

The Assembler features all of the following: complete 6809 instruction set; conditional assembly; local labels; assembly to cassette tape or to memory; listing to screen or printer; and mnemonic error codes instead of numbers.

The versatile monitor is tailored for debugging programs generated by the Assembler and Editor. It features examine/change of memory or registers, cassette load and save, breakpoints and more. **SDS80C Price: \$89.95**

## MICRO WORKS COLOR FORTH

- Forth is faster to program in than Basic
- Forth is easier to learn than Assembly Language
- Forth executes in less time than Basic

Forth is a highly interactive language like Basic, with structure like Pascal and execution speed close to that of Assembly Language. The Micro Works Color Forth is a Rompack containing everything you need to run Forth on your Color Computer.

Color Forth consists of the standard FORTH Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. Color Forth also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. Color Forth contains 10K of ROM, leaving your RAM for your programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound. The 112-page manual includes a glossary of the system-specific words, a full standard FIG glossary and the BEST! From the leader in Forth, Talbot Microsystems. **Price: \$109.95**

THE MICRO WORKS

P.O. BOX 1110, DEL MAR, CA 92014 [619] 942-2400

## MICROTEXT: COMMUNICATIONS VIA YOUR MODEM!

Make your Color Computer an intelligent printing terminal with off-line storage! The Microtext module is just what you'll need for:

- Talking to a timeshare system or information service
- Printing out what is received as it is received
- Saving received text to cassette tape
- Re-displaying the received text even while on-line
- Communications with other computers
- Using your computer as a general-purpose 300-baud terminal
- Downloading programs from other computers

The Microtext module is a program pack containing not only firmware but a second serial port so that both your printer and modem can be connected at the same time. Microtext can be configured for any serial printer that will work with the Color Computer, even if it requires line feeds! But even if you don't have a printer, you can keep a permanent copy of your data by storing to cassette tape. Also, any Radio Shack/Centronics-compatible parallel printer may be used by adding the Micro Works' P180C parallel interface.

For those of you with special terminal applications, Microtext has selectable parity; it sends odd, even, mark or space. With mark parity (which is default) you can send to computers requiring either seven or eight bits. All 128 ASCII codes can be sent. Exchange programs with other Color Computer users! Basic programs may be downloaded from other computers or timesharing systems.

You'll find many uses for this versatile module! Available in ROMPACK, ready-to-use, for **\$59.95**.

## MACHINE LANGUAGE

**MONITOR TAPE:** A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. **CBUG Tape Price: \$29.95**

**MONITOR ROM:** The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to re-load the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pak I. **CBUG ROM Price: \$39.95**

**SOURCE GENERATOR:** This package is a disassembler which runs on the color computer and generates your own source listing of the BASIC Interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. **80C Disassembler Price: \$49.95**

## MACRO-80C

This is a disk-based editor, macro assembler and monitor, written for Color Computer by Andy Phelps. THIS IS IT — The ultimate programming tool!

The powerful 2-pass macro assembler features conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. There are no changes, constraints or shortcuts in the source language definition. Incorporating all of the features of our Rompack-based assembler (SDS80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility.

The screen-oriented text editor is designed for efficient and easy editing of assembly language programs. The "Help Key" feature makes it simple and fun to learn to use the editor. As the editor requires no line numbers, you can use the arrow keys to position the cursor anywhere in the file. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which are longer than 32 characters.

DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

The editor, assembler and monitor — as well as sample programs — come on one Radio Shack compatible disk. Extensive documentation included. **MACRO-80C Price: \$99.95**

# HARDWARE

**PARALLEL PRINTER INTERFACE** — Serial to parallel converter allows use of all standard parallel printers. P180C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **P180C Price: \$69.95**

**MEMORY UPGRADE KITS:** Consisting of 4116 200ns, integrated circuits, with instructions for installation. **4K-16K Kit Price: \$39.95. 16K-32K Kit (requires soldering experience) Price: \$39.95.** For Rev. level E, ET, NC and TDP-100s, we carry 64K chips; upgrading is easy! Eight prime 64K chips and instructions: **\$64.95**

**Romless Packs** for your custom EPROMs — call or write for information.



GOOD STUFF!

# BOOKS

**6809 Assembly Language Programming**, by Lance Leventhal, **\$16.95**

**TRS-80 Color Computer Graphics**, by Don Inman, **\$14.95**

**Assembly Language Graphics for the TRS-80 Color Computer**, by Don Inman, **\$14.95**

**Starting Forth**, by L. Brodie, **\$19.95**

# GAMES

**Star Blaster** — Blast your way through an asteroid field in this action-packed Hi-Res graphics game. Available in ROMPACK; requires 16K. **Price: \$39.95**

**Pac Attack** — Try your hand at this challenging game by Computerware, with fantastic graphics, sound and action! Cassette requires 16K. **Price: \$24.95**

**Haywire** — Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. **\$24.95**

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The CASE of the SILVER CoCo

Some folks seem to think that the silver case on the CoCo bears a striking resemblance to the plastic space toys seen in various stores around; I happen to be one of those folks. And, apparently, there are more like me hanging around Tandy Towers, because all their new computers are coming out with some version of a molded-in grayish-whitish-tanish color. When the silver started flaking off badly from the corner of my own CoCo, especially where I rested my right hand, I figured enough was enough.

But, wait! That color showing through the silver looks like a molded-in grayish-whitish-tanish color. Are they really hiding the new color under all that silver? Hmmm. I have some methylene chloride here; I wonder what would happen if ??? Well, if you have easy access to some of that stuff to strip your CoCo with —DON'T—! It will eat your case alive!

I'm sure there are other solvents around that will do the job, but I found that 1,1,1 TRICHLOROETHANE works perfectly (I'm told that they also use it to decaffeinate coffee.) It isn't really fast, and takes some rubbing, but, after you have gotten all the little silver flecks off, it leaves a very finely etched finish which would credit any business machine. And, it seems, the longer you rub the nicer the etch. Such a fine etch will likely take a shine if rubbed often, but a few licks with the solvent will cure that.

Use a clean cloth eight or ten inches square, and have some spares handy; the silver builds up in the cloth, quickly

turning it black. Use enough solvent to make the cloth wet, but well short of dripping. You'll probably have trouble getting the silver out of the groove around the keyboard. Squeeze a few drops of solvent into the groove, keeping it level. In fifteen or twenty seconds you should be able to get it out with a cotton swab. A fingernail works well to get the very bottom corner, if it is still wet.

When everything looks free of the silver color, get out another clean cloth, and do the whole thing all over again. You'll be surprised how much more you can still get off, and you can also work on rubbing out any shiny spots. Any streaky look will also probably disappear with this going over. If not, do it again with another cloth.

You may have other solvents you'd like to try. If so, put a small drop on the bottom for a few seconds to see what happens. Some solvents will rapidly soften both the finish and the plastic. Methylene Chloride, as mentioned above,

and Acetone are both in this category. Lacquer thinner has considerable variation from one brand to the next, and from one type to the next; each has different percentages of the three solvents already mentioned, and/or others as well. Some lacquer thinners may be too "hot" for the job.

Oh, yes. Just one more thing. I don't advise doing the job even close to the computer board. Even the vapor could cause unwanted damage. And, for plenty of ventilation, I did mine outdoors.

So, there you are. If you don't care for silver, and have a better color under it (surely, you have some rubbed-off spots on your CoCo by now — I understand that some of the early cases were molded with black plastic), give this a try. I think my new molded-in grayish-whitish-tanish color is just gorgeous. Now, I just wish I could find a real keyboard under the one I have.

Jim LaLone

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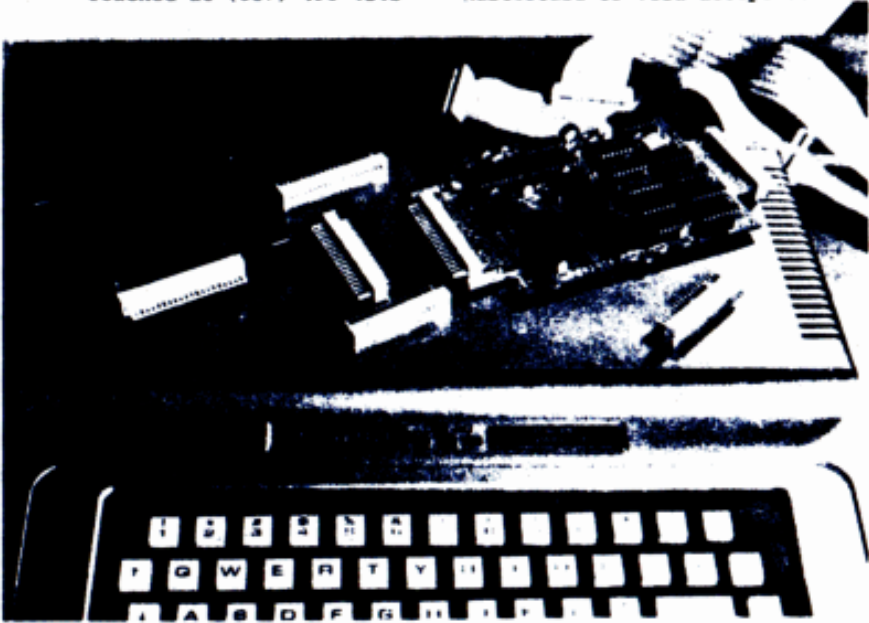
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# REVIEW

## TRS-80C MULTI-PAK INTERFACE

From **RADIO SHACK**  
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\$179.95

The **TRS-80C MULTI-PAK INTERFACE** from Radio Shack allows you to plug in up to four different ROM Paks at the same time, and lets you switch between them by a Hardware Switch on the front, or by Software pokes. It is just the thing for those of you who have been trying to deal with the explosion of ROM Paks without wearing out the Expansion Slot Connector on the computer.

The Radio Shack **Multi-Pak Interface** comes in a color-coordinated case that matches the color computer's silver-grey color and design. It plugs into the cartridge slot, and extends the computer's width by twelve inches; it is eight and a quarter inches deep. The slots are located on the top of the unit. The Disk Controller and ROM Paks are installed vertically, while the Interface plugs snugly against the side of the computer. It requires a grounded type (3-prong) AC outlet.

The **MULTI-PAK Interface** was apparently designed in response to the people who complained that they could not easily save Graphics produced on the X-Pad to Disk, as this use is prominently pointed out in the owner's manual. The slots are selected either by the switch on the front, or by software selection, by **Poking 65407** with **00** for #1, **17** for #2, **34** for #3, and **51** for slot #4.

### — NOTE —

The Manual states that this address is 65439; the Addendum correct's this error to **65407**.

When you select a slot by Software, you loose the front panel switch controls until you reset the computer. By using the Rom-disable poke (**POKE &HFF23,36**), and then selecting the slot it's in, you can examine the ROM Paks.

There is a handy hint in the manual that tells you that if you leave a slot empty, you can easily switch between Extended Basic and Disk Basic by moving the switch to the empty slot and pressing **RESET**. This is another neat way to save unplugging the disk controller.

Of all the other adapters on the market, this is the only one that has the same styling as the CoCo, and it includes a heavy duty power supply to boot. The Radio Shack **Multi-Pak Interface** is a good investment in the health of you computer, especially if you like to experiment with ROM-Paks, and will save your Expansion Connector from wearing out if you have more than the Disk Controller. So read the ads, compare features and power supplies, consider the Cartridge Support that Radio Shack has **NOW** and **WILL HAVE** in the future, and then make your own decision. Mine was in favor of the **MULTI-PAK**.

Joe Patrick

# Press Release



NEW PRODUCT RELEASE

## MAGIGRAPH

The Micro Works is pleased to announce the release of a graphic development utility for the Radio Shack Color Computer. MagiGraph is for experienced Basic and assembly language programmers. The program simplifies the task of drawing highly detailed graphic characters, up to and including an entire high-resolution graphic screen. MagiGraph has a full set of logical operation and pixel manipulation functions that simplify the development of a character in all its different possible color and position combinations. The program offers nine animation buffers, which allow the various positions of an animated character to be tested and revised so that animation blends together smoothly. Finally, the pixel codes of a graphic character can be listed in hexadecimal numbers to a printer, and the graphic screen can be saved on cassette tape or floppy disks to be used later by another program or revised with MagiGraph.

MagiGraph, written by Kevin Dooley, is available on cassette for \$34.95 (16K required); disk for \$39.95 (32K Extended Color BASIC required); Amdisk cartridge for \$44.95. Extensive documentation and plenty of sample programs are included in the package.

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# BULLETIN BOARD SYSTEM

## FLEXNET BBS

The FLEXNET BBS (405-722-6809 in Oklahoma City) is an unusual Bulletin Board System, in that it more resembles an Operating System than a traditional BBS system. It is an adaptation of the FLEX operating system from Technical Systems Consultants (TSC). I see a great advantage for the experienced user of FLEX, as he can go right to work on this BBS. For those unfamiliar with FLEX, it may take a little time to get used to the system; but think of the opportunity you have to learn how this great Disk Operating System works.

I, like many others reading this, was introduced to FLEX through my purchase of a TRS-80 Color Computer, and was a little taken aback with the price of the FLEX programs. Most CoCo owners selected their computer for one reason: they didn't have a lot of money to spend. Taking into consideration that the computer was only a couple of hundred dollars to start with, well, you get what you pay for — especially with the limited operating system that RS offers with the CoCo.

I see the FLEXNET BBS as being a great service to the Color Computer owners in two ways. First, it allows the potential purchaser of one of the fine

FLEX implementations for the CoCo to try a FLEX-like system before he buys a copy. Second, there are lots of FLEX utilities available on FLEXNET; written by other FLEXNET users. This is a great way to enhance your FLEX library, and learn a heck of a lot at a minimum expense. The programs are in both source and object form. There are Communications Programs that you can download in source form, and then assemble, that will allow you to download machine language files. Initially you would have to purchase a copy of FLEX and an Assembler if you wanted to use some of the FLEX utilities (some FLEX Conversions include the Assembler). There are also a lot of free download programs on the system that will run under RS Disk BASIC.

Another nice feature of this BBS is that there are many knowledgeable people on the board, with a lot of info about FLEX and the 6809 in general. If you pose a technical question on the BBS, there is a good chance you'll get it answered.

When you check into the board, you will get a short greeting message and then the prompt "FLEXNET". I thought a lot of being able to check into the BBS without having to give my name; this is the first one I've ever seen like that. When you get the prompt, it's the same +++ that is used by FLEX; you give it a FLEX command, and it's off and running. An example would be CAT; this would give you a catalog of the disk files. DIR gave me a more expanded directory of what was on the disk, and DIR 1 gave me a further directory of what was probably on another disk drive. Another interesting

directory-type command was called FILES.CMD; this was very handy because you can get a directory of files that have specific characteristics. For instance, if you only want a directory of files starting with "A," type FILES A, or if you want files with just the .TXT extension, just type FILES .TXT (many of the FLEX Utilities work the same way — CAT, DIR, COPY, etc.). To list a file that might be of interest, one would type LIST FILENAME.EXT. The command LISTNEW <MM DD YY> will list all the files dated on or after the date you specify. This will allow you to look at all the files you want to without typing in each filename individually.

If you check into FLEXNET and forget what to do, you can just type HELP and the system will walk you through it. The same goes for any command you may have a question about. For example, if you want more information about the command file SEND.CMD, just type HELP SEND and the system will give you instructions on using the system's file transfer capability.

You can leave a program, message, or any other text-type file on the board using the FLEX command BUILD FILENAME. Again, if you are not familiar with FLEX, just type HELP BUILD.

If you want to know more, I would recommend checking into this very interesting BBS system. There are some pretty dull and poorly run BBS's in the country, and this is definitely not one of them. My hat off to Roger Walton and Bill Holland.

Bob Rosen  
Spectrum Projects



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----- Color Computer -----

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## THIS 'N THAT

Continued from page 1

active, because the Interrupts are turned off to allow the Double Density Disk Operation with the 0.9 MHz Clock speed of the CoCo. One bug has turned up, which will obviously be fixed before the System is released from the stores (not bad for a System of this complexity).

So, just **WHAT** is OS-9? To **REALLY** find out what OS-9 is and does, you will have to use it a while; you can begin to get some idea of what it can do for you by reading the reviews and discussions we will have over the next several months. This issue contains an "In Depth" look at the Manuals that come with the System.

OS-9 was developed in conjunction with the development of the 6809 Microprocessor Chip and the BASIC09 Programming Language by **Microware Systems Corp.** and **Motorola Inc.** One of the primary aims in the design of the 6809 was to develop a MPU Chip that would operate efficiently with the Compiler oriented Structured Programming Languages of today (which were just beginning to appear at that time). Since BASIC is such a popular Language, it was decided that a "Super" BASIC should be developed for the "Super" MPU. As **BASIC09's** development progressed, it became apparent that the "usual" Operating Systems would not allow proper utilization of the features that were being build into **BASIC09**, so an investigation was launched to find a suitable Operating System.

Since UNIX was developed "BY Programmers FOR Programmers", it had many of the desired features; but it was designed for operation on the **BIG** Computer Systems. Some of it's features could not be **EFFICIENTLY** used on lower-cost Computer Systems, such as the process of saving to mass storage the "present program state" and loading in a new program **EVERY TIME** THE SYSTEM SWITCHED TO ANOTHER USER; at the Multi-Meg Transfer Rates that **THEY** use, that procedure works fine, but for the smaller, slower Systems that would be using the 6809 Processor, that was deemed to be an unacceptable bottle neck. A new approach was required.

This led to the "Memory Module" concept of Memory Utilization that differentiates **OS-9** from most other Microprocessor-Based Multi-User Operating Systems. The ease of developing Position Independent, Recursive Code for the 6809, combined with the exceptional Addressing flexibility, multiple 16 Bit Registers, dual Stack Pointers, Direct Page control, etc., allows OS-9 to make maximum utilization of the available Memory Space by loading Programs into that space at **ANY** location, and that can be shared by **multiple Users**. It was decided to make OS-9 a "Modular" Operating System, providing a flexibility unheard of in a **MAJOR** Operating System. Different Modules are linked together by "Data Tables" that describe specific features of the various devices. This allows OS-9 to be used for anything from a simple industrial controller to a major Multi-User, Multi-Tasking Disk Operating System, by simply choosing or changing the required modules and writing a few data tables. OS-9 Systems can be ROM-Based, RAM-Based, Tape-Based, Disk-Based, etc.

OS-9 has been available for a few years now, and is fairly well "debugged". It is being used by **NUMEROUS** Industrial Control Manufactures, as well as such companies as Motorola, GIMIX, Helix, Smoke Signals, several Overseas Producers, etc., on their Business and Software Development Computer Systems. Software support for OS-9 is just beginning a rapid growth, as the Programming Languages running under the System are **EXTREMELY** Powerful. Languages such as **BASIC09** (which may be available as you read this), Pascal, C, Cobol, etc., will be running on the CoCo OS-9 System shortly; as will Word Processors, Data Base Management Systems, Electronic Spreadsheets, Accounting Packages, etc. We see "feverish" activity in support of this package, making the future rosy indeed.


We also have several Reviews this month, and I would like to point out one in particular. Jack Lane reviewed the excellent **Elite\*Calc** Electronic Spreadsheet Program, but ran into a small problem with it. We sent his review to **Elite Software** for their comments, and received some excellent comments from them, which are included following the review. The point is this; their comments provide a lot of insight into why the program was written the way it was, what kinds of decisions and trade offs they had to make in designing it, etc. We have offered our regular advertisers additional space during the next year to do exactly what **Elite Software** did; discuss their product/s on the basis of the **HOWs**, **WHYs**, etc. This will help them in providing more detailed

information than they can afford to pay for in advertising, and help **YOU** in learning more about the products, and what is involved in developing them. I am sure that **THEY** would like to hear **YOUR** comments on their products, both pro and con, also. The **PROVIDERS** need to know what the **CONSUMERS** want and need; your comments, either directly to them, or through letters to **Color Micro Journal**, will help them in deciding what to produce next.

Finally, as some of you may be aware, **Jon Shirley** is no longer with **Tandy Corp.**, but has moved on to take over as **President of Microsoft Corp.** (which supplies a major portion of the Radio Shack Software and Operating Systems). Although we did not always see eye-to-eye with Jon on some things, we **ALWAYS** knew **EXACTLY** where we stood with him, and all of us here at **Computer Publishing Inc.** want to wish him the **VERY BEST** in his new venture with **Microsoft**.

The old Dept. of Computer Merchandising will be broken down into three separate Depts. due to Radio Shack's growth. **Ed Juge** will become the director of merchandising for **Business Computer Products**; **Mark Yamagata** will take over as director of merchandising for **Personal Computer Products**; and **Bill Wash** will become the director of **Computer Merchandising Services**. We look forward to a long and enjoyable working relationship with the new team at Tandy.

— RLN —

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# REVIEW

Fast Lane

By: Acesoft Computer Products  
1680 North Page Drive  
Deltona, FL 32725  
Tape: \$24.95

Fast Lane, written by Jim Ebbert of Acesoft Computer Products, is one of the better games that I have seen for the Color Computer. It's in Machine Language and requires at least 16K Non Extended Color Basic. The game has very good graphics.

You join the ranks of the rebel forces. They have many men, but the resistance is weak due to a lack of powerful weapons. To get better weapons, they have resorted to stealing weapons being transported from a factory in the Alpha-Iota system to the main base of the Empire. It's not easy. The pilot must cross lanes of heavy space traffic, sneak through the factory, while dodging moving walls and electrified walls, get the "Turbo-Blast Gun", run back through the factory, and return to his ship. Every time the pilot steals a gun, the Empire adds more security devices, like more electrified walls. The game requires eye-hand co-ordination, and it is appropriate for younger children as well as older game addicts.

Loading the game is done with a simple "CLOADM:EXEC" and does not take very long. Once loaded, you start the game by pressing the space-bar. You use the arrow keys to control the spaceship on the first screen and the little person running around the maze on the second screen. On the second screen, the controls are a little bit touchy, so I would recommend that you just tap the keys, while on the first screen, it is better to hold down the keys.

You start in on what appears to be rush hour on the inter-galactic space-freeway. All you have to do is to cross the street. Sounds simple? It's not. There are vehicles completely filling

the screen. They are going up and down while you are trying to go from right to left. You go a little bit faster than the other cars, but it is not wise to play Chicken with them, because the chances of your making it are slim. The vehicles include what look like space-age trucks, cars, and slow-moving buses. And if this isn't enough, the screen is timed. You have only 10 seconds to get across, so forget fooling around here! After one or two (or three) tries, I got past this screen.

The second screen is the killer. It took me about an hour to learn how to get through. It is a maze with moving walls, doors that open and close, and everything is electrified. You must first go through the maze, then get the "Turbo-blast Gun" and then get out. Getting in was not hard. It took me only ten tries. Getting the gun was the easiest part. You just go up, touch the gun, the gun disappears, and then you go down to the door leading back into the maze. Now comes the hard part. You must then work your way through five doors, as they open and close on you, with the walls moving up and down like giant potato mashers, avoiding the ever-present electrified everything. Getting out the last door isn't enough, because then you have to race a wall to the bottom of the screen. Even though you may be fast enough to get this far, timing here is everything because that wall is determined to squash you. However, Jim Ebbert took pity on us and gave us a whole 50 seconds to conquer this screen!

Assuming that you made it through all this alive, you will now be shown your score. Then, after pressing the space-bar, you go back to the first screen, which now has more cars, trucks, and buses. If you clear this screen again, you are back to the second screen but this time with a new wall in your path, forcing you to make another simple turn around it. It's not so simple. Because of the speed of your man, you may end up hitting an electrified wall. After you clear this screen again, you will be shown your score. The third time through the first screen

is extremely hard, for the cars block a certain path which was once open. The third time you go to the second screen, there is an additional wall which you must pass. It is set up right between the maze and the gun. It has one door in it, and fortunately, no moving walls. I have yet to get past this screen so I don't know what comes next, but I sure am trying to find out!

Fast Lane has a lot of features I really like, such as displaying high score. It does not save the high score between turning the computer on and off, but it does keep track of the highest score while the game is running, enabling you to brag about it while you challenge your family and friends. It will also give you your score when you are killed. You can then start a new game by pressing the space-bar. It has a pause feature, too, so that in any part of the game you can just hit "P" and answer the phone, answer the door, or just breathe. To continue, you hit the space-bar.

Fast Lane provides a constant challenge and holds your interest for a long period of time. I have had it for about two months and I am still playing it, determined to beat it. I think it is a very good game and well worth the \$24.95.

Edward Hefter

## The Clear Winner



The Original FLEX from Data-Comp

## Press Release

New Product Announcement For  
COCO SLEUTH  
A Program Analysis and Debugging Tool

Computer Systems Consultants, Inc.  
1454 Latta Lane, Conyers, GA 30287  
Telephone Number 404-483-1717/4578

Computer Systems Consultants announces the immediate availability of the COCO SLEUTH disassembler system. It is a derivative of SUPER SLEUTH, which has been available for several years for FLEX, UNIFLEX, and OS/9 operating systems. COCO SLEUTH runs under COCO DOS and processes object programs in COCO DOS format, producing COCO DOS text files.

COCO SLEUTH is a collection of three programs which enables the user to examine and/or modify binary program files on disk or in memory, on Tandy TRS-80 Color or TDP-100 or similar computers, with at least 32K bytes of memory and at least one disk drive.

COCO SLEUTH is totally interactive, allowing the user to perform trial disassemblies multiple times, before producing the final disassembly. Programs may be disassembled from disk or memory into source code format and the source may be displayed, printed, or saved on disk for later assembly using one of several standard COCO assemblers. Address ranges may be specified as containing characters, hex constants, addresses, or instructions, in order to improve the disassembled file.

Labels produced by SLEUTH may be changed globally to labels of the user's preference. Cross reference listings of labels may be produced from any Motorola formatted assembler program, including COCO SLEUTH generated programs, to assist in debugging and modification.

Programs in ROM or on disk may be "altered" with the altered program being saved on a disk file; the resultant file could then be used to program a new ROM, etc.

COCO SLEUTH is supplied as a set of 6809 object code files for the Tandy TRS-80 Color or TDP-100 or similar computers. The processors which may be analyzed are 6800, 6801, 6802, 6803, 6805, 6806, 6809, and 6802.

COCO SLEUTH is available immediately for \$49.00.

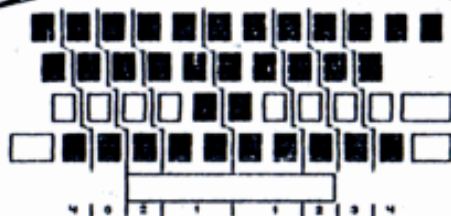
SUPER SLEUTH for COCO FLEX is available for \$50.00 (object only) and \$99.00 (with source).

SUPER SLEUTH for OS/9 is available for \$101.00 (with source).

SUPER SLEUTH for UNIFLEX is available for \$100.00 (with source).

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# REVIEW

## THE SANDS OF EGYPT

Licensed by DATASOFT  
to RADIO SHACK  
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Requires 16K Extended BASIC and Disk  
Disk \$29.95

The **SANDS OF EGYPT** is a very good 16K Adventure Game. It uses **Animated Graphics** as well as Text to guide you through a somewhat tough adventure. You will die of thirst many times before you are able to locate even the bare essentials for survival. This one is definitely for the **Hard Core Adventurer**; it will challenge even the best of you. Disks and Extended Color Basic are required, because this program starts out in BASIC, and then switches over to Machine Language. The various scenes are pulled off of the Disk as it needs them. It operates much as the original "Great Cavern" Adventure (Alias Microsoft Adventure, Zork, etc.) did, by accessing only the section you are currently working in, and linking to the others as required by your movements.

As "Sir Percy", you have set out with a group of archeologists to find the Pyramid of Ra, and, being a very proper Englishman who has been critically acclaimed for nineteen books on etiquette, you have diligently tried to teach the other archeologists proper digging methods and how to keep their Khakis starched. But they became increasingly disrespectful, and refused to starch their Khakis and have high tea on schedule. Thus you found it necessary to remove some of their privileges.

## COLOR COPY

COLCOPY is a menu driven copy utility that copies data files or programs: disk to tape, tape to disk or disk to disk. It also kills files or programs.

Many options are provided: copies basic programs, machine language programs or data files, allows selection by groups of filenames or extensions, individual files by menu selection, writes multiple copies of files to tape, backup a disk to tape, restore a disk from tape, copies files in alphabetic sequence and much more.

Written in basic with machine language sub-routines. Includes program on cassette and instructions.

Requires 32K, DOS.

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DEALER INQUIRES INVITED

After five days of argument, you awake on the sixth morning to find that all of your companions have run off with everything except your pocket compass, leaving you stranded in the desert. As you wander aimlessly about the desert, you will discover items of yours that these scoundrels have discarded. If you are **VERY** lucky, you will manage to find your way to an oasis, and be able to save yourself from dying of thirst. However, this is not easy, as Sir Percy is a very proper English Gentleman. Emphasis on **proper**; it was his mania for absolutely proper etiquette that caused him to be abandoned. After all, what working archeologist or guide really gives a fig about the proper time to drink tea? If you manage to stay alive for a while, and find the necessary equipment for survival, the next hurdle is to find the Pyramid, and a way into it. This is harder than finding survival equipment. Thus begins your great search for the Pyramid of Ra. Will it be fame and glory for you, or will you become another bleached skeleton in the **Sands of Egypt**???

If you tire of searching the desert and trying to find the pyramid, or locate the treasures of the Pharaoh, the game DOES have a Save Feature, so you can quit and come back another day. It is a **good game**, has **excellent graphics**, and an **easy command structure** which will accept either single letter or two-word commands. This allows movement without typing in two words, which can be very tiresome. Careful perusal of the manual, as well as the letter from Sir Percy to Queen Elizabeth, is a good idea, because there ARE clues there, but they are subtle and will escape you if you're not careful. Help is available, but only at certain locations, so it's a good idea to ask often.

The **Sands of Egypt** is a real eye pleaser; graphically. But the fact that the desert seems to move the same direction when you type South and West or North and East can be somewhat confusing. Also one of the pictures shows two pyramids, but I can only seem to locate one. These were the only annoyances that I noted in the program, but they do not detract from the game's enjoyment. I **heartily recommend** this game to anyone who likes adventures; and you get the bonus of a very interesting screen. But be warned; this is a **hard** adventure to solve. It's not for the faint of heart or easily discouraged. Humm. If I rope the camel then I might..... Oh well, try this one, it's interesting. But don't forget to take your etiquette book; you'll need it.

Joe Patrick

# REVIEW

## SP-1

Epson Serial-to-Parallel Interface  
**SPECTRUM PROJECTS**  
\$49.95

Do you have a Color Computer and want a printer for it? Does it seem like all the good deals are just on parallel printers? Or do you already have an Epson Printer and wish you could connect it to your CoCo? Well then, I just may have some good news for you.

The **Serial-to-Parallel Interface** for the **Epson MX-80 Printer** carried by **SPECTRUM PROJECTS** is the SP-1 made by CNR Engineering and is a great buy. It is just \$49.95, compared to about a hundred and fifty dollars retail for Epson's official version. This little board will let you use the Epson with your Color Computer.

There are several features about this board that I really liked. The first one is that it comes with a cable that is over five feet long to connect to the serial port in the rear of the computer. Next are the eight switches on the board to allow proper configuration -- the first three are for setting up the correct parity for your system and the other five allow selection of baud rates ranging from 300 to 4800. The only switch I set to the ON position was the seventh one, 600 baud. Also, all the IC chips are socketed on the board, making repair simple if needed. All of the features that I tried with my Printer with Grafrax worked OK with this Board.

Installing the board is easy, although no instructions were included. The four screws holding the Epson printer together must be removed from the bottom, and the Knob pulled off of the platen shaft. After you have removed the top of the printer, look for four posts near the parallel cable connector. The serial board sets on top of these posts and plugs into a socket that is on the printer's main board. Now insert the screws that came with the serial board into the four posts to stabilize the board. This is where I ran into my only problem. Two of the holes did not line up well enough with the posts for the screws to go in (two screws are plenty to hold the Board, if you don't jerk the cable). Reassemble the printer, and you are ready to get all those program listings you've been wanting, or use that word-processing package!

Dan Williams

## Color Computer 2 - 64K & DISK

The **NEW Color Computer 2** is the same width as all of the others, but is only about 2/3 as deep, front to back. A couple of the **obvious** changes are that the RF Modulator is standing on edge, and there is **NO 12VDC** supply; it is strictly a **5 Volt** machine. There is also a solder-on fuse on the AC Input.

The 16K RAM Chips provided in the **CoCo 2** are pin compatible with the **64K Chips** that we have been using in the older Computers (4164); remove the 16K Chips and insert the 64K Chips. There are two "solder spots" about 1/16" apart just to the left of the 6822 Chip near the Keyboard end marked "W1"; jumper these,

and you have **64K RAM** in the **CoCo 2**.

The **Disk Controller** **MUST** have 12VDC to operate. We found that the 5V Regulator **supply voltage** was close enough; we ran a lead from there to Pin 2 of the Cartridge Slot connector, and the Disk Controller worked OK. You may need to readjust the "Write Pulse" width; ours were close enough (on three different Computers, but all with the same Controller). The **SURE** way to use the Disk Controller with the **CoCo 2** is with the new **Multi-Pal Expansion Unit** from Radio Shack; it has its OWN 12 Volt Power Supply.

--- RLN ---

Color Micro Journal



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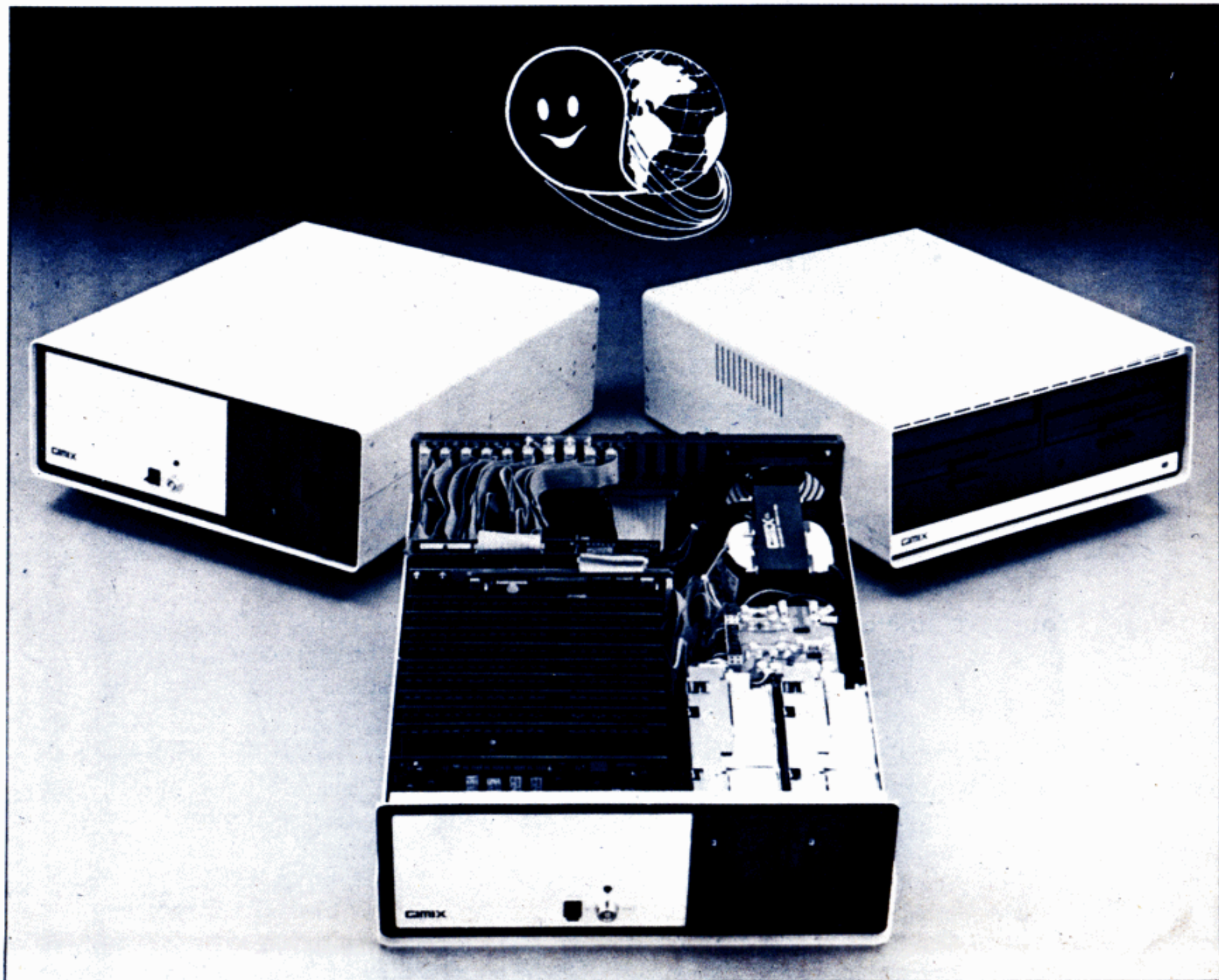
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